

APPENDIX E

AIR QUALITY

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TABLE OF CONTENTS

E.1	EMISSIONS ESTIMATIONS AND METHODOLOGY	E-1
E.2	EMISSIONS CALCULATIONS	E-7
E.3	RECORD OF NON-APPLICABILITY	E-29

LIST OF TABLES

Table E-1	Estimated Construction Emissions – Alternative 1	E-2
Table E-2	Estimated Annual Emissions from Construction Equipment – Alternative 1	E-3
Table E-3	Estimated Annual Emissions from Construction Worker Vehicles – Alternative 1	E-3
Table E-4	Annual VOC Emissions from Architectural Coatings – Alternative 1	E-4
Table E-5	Annual PM _{2.5} Emissions from Surface Disturbance – Alternative 1	E-5
Table E-6	Project Areas and Durations	E-9
Table E-7	Annual Emissions Equipment Use	E-13
Table E-8	Heavy Equipment Emissions	E-13
Table E-9	Architectural Coating Emissions (Paint)	E-17
Table E-10	Paving Off-Gas Emissions	E-18
Table E-11	Fugitive Dust Emissions	E-19
Table E-12	Worker Trip Emissions	E-20
Table E-13	Estimated Construction Emissions – ST 40 and ST 52	E-24
Table E-14	Estimated Construction Emissions – Alternative 2	E-24
Table E-15	Estimated Construction Emissions – Alternative 3	E-25
Table E-16	Heating Emissions	E-25
Table E-17	Worker Commutes	E-26
Table E-18	Emissions from Generators Exempt from Permitting	E-26
Table E-19	Total Operational Emissions (tpy)	E-27

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E.1 EMISSIONS ESTIMATIONS AND METHODOLOGY

The U.S. Army has considered all foreseeable direct and indirect sources of air emission associated with the proposed action. *Direct emissions* are emissions that are caused or initiated by a federal action and occur at the same time and place as the action. *Indirect emissions* are reasonably foreseeable emissions that are caused by the action but might occur later in time and/or be farther removed in distance from the action itself, and that the federal agency can practicably control. More specifically, project-related direct emissions would result from the following:

- *Construction activities:* The use of non-road equipment (e.g., bulldozers, backhoes), worker vehicles, the use of volatile organic compound (VOC) paints, paving off-gasses, and fugitive particles from surface disturbances
- *Operational activities:* Commuting by new personnel and equipment are exempt from permitting under 9VAC5-80-1105 (i.e., gaseous fuel burning units w/ max heat input less than 50,000,000 Btu/hr and diesel generators with electrical output of 1,125 kW). Notably, The portion of an action that includes major or minor new or modified stationary sources that require a permit under the new source review (NSR) program (Section 110(a)(2)(c) and Section 173 of the Act) or the prevention of significant deterioration program (title I, part C of the Act) are exempt from the GCR.

E.1.1 Construction Emissions

All direct and indirect emissions associated with Alternative 1 were estimated. The construction emissions were generated by estimating equipment use for construction and roadway improvement projects to support the Army's mission of establishing optimal land use and optimal allocation of resources. A detailed description of the proposed action and a list of the proposed short- and long-term projects is in Section 2 of the EIS.

Demolition and construction emissions associated with the use of construction equipment (e.g., bulldozers, backhoes), worker vehicles, the use of VOC paints, paving off-gasses, and fugitive particles from surface disturbances are presented in Table E-1 for all years of construction under Alternative 1. This section also outlines all the calculations and assumptions made to derive these construction emission estimations.

E.1.1.1 Heavy Construction Equipment

Pollutant emissions resulting from activities associated with constructing the proposed buildings, parking facilities, and roadways were estimated. The typical construction would involve such activities as demolition of existing buildings or structures, utility installation, road construction, site clearing and grading, building construction, and asphalt paving.

Construction would involve the use of various non-road equipment, power generators, and trucks. Pieces of equipment to be used for building construction include, but are not limited to, backhoes, loaders, excavators, air compressors, dozers, cranes, pavers, graders, rollers, and heavy trucks. Information regarding the number of pieces and types of construction equipment to be used on the project, the schedule for deployment of equipment (monthly and annually), and the approximate daily operating time (including power level or usage factor) were estimated for each individual construction project based on a schedule of construction activity.

Emissions from construction activities were estimated based on the projected construction activity schedule, the number of vehicles/pieces of equipment, and vehicle/equipment utilization rates. Emission factors for heavy-duty diesel equipment were obtained from USEPA's *NONROAD2005 Emissions Model* (USEPA

2005a). The equipment and vehicle operation hours were estimated based on R.S.Means' *Building Cost Construction Data*, 64th annual edition (Waier 2006), and field experience from similar projects.

Table E-1. Estimated Construction Emissions - Alternative 1

	Construction Emissions (tpy)					
Year	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
Year 1	27.8	45.1	7.9	3.7	5.4	7.5
Year 2	39.4	61.8	9.7	5.0	7.9	9.6
Year 3	29.8	40.5	4.7	3.0	5.1	7.5
Year 4	15.7	20.9	2.8	1.7	2.8	4.2
Year 5	40.5	50.7	5.0	3.9	6.9	10.3
Year 6	44.4	61.2	7.3	5.4	8.7	11.8
Year 1	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
Heavy Equipment Emissions	17.7	44.3	4.3	3.1	5.4	4.4
Worker Trip Emissions	10.1	0.8	<0.1	<0.1	<0.1	0.7
Architectural Coating Emissions	<0.1	<0.1	<0.1	<0.1	<0.1	0.9
Paving Off Gas Emissions	<0.1	<0.1	<0.1	<0.1	<0.1	2.3
Fugitive Dust Emissions	<0.1	<0.1	3.6	0.5	<0.1	<0.1
Total	27.8	45.1	7.9	3.7	5.4	6.1
Year 2	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
Heavy Equipment Emissions	24.9	60.6	4.3	4.2	7.9	5.6
Worker Trip Emissions	14.4	1.1	<0.1	<0.1	<0.1	1.0
Architectural Coating Emissions	<0.1	<0.1	<0.1	<0.1	<0.1	2.1
Paving Off Gas Emissions	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fugitive Dust Emissions	<0.1	<0.1	5.3	0.8	<0.1	<0.1
Total	39.4	61.8	9.7	5.0	7.9	7.8
Year 3	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
Heavy Equipment Emissions	16.1	39.4	2.8	2.7	5.1	3.7
Worker Trip Emissions	13.8	1.1	<0.1	<0.1	<0.1	1.0
Architectural Coating Emissions	<0.1	<0.1	<0.1	<0.1	<0.1	2.8
Paving Off Gas Emissions	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fugitive Dust Emissions	<0.1	<0.1	1.8	0.3	<0.1	<0.1
Total	29.8	40.5	4.7	3.0	5.1	5.8
Year 4	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
Heavy Equipment Emissions	8.5	20.4	1.5	1.4	2.8	1.9
Worker Trip Emissions	7.2	0.6	<0.1	<0.1	<0.1	0.5
Architectural Coating Emissions	<0.1	<0.1	<0.1	<0.1	<0.1	1.8
Paving Off Gas Emissions	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fugitive Dust Emissions	<0.1	<0.1	1.3	0.2	<0.1	<0.1
Total	15.7	20.9	2.8	1.7	2.8	3.1
Year 5	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
Heavy Equipment Emissions	20.4	49.1	3.8	3.7	6.8	4.6
Worker Trip Emissions	20.1	1.6	0.1	0.1	<0.1	1.4
Architectural Coating Emissions	<0.1	<0.1	<0.1	<0.1	<0.1	4.3
Paving Off Gas Emissions	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fugitive Dust Emissions	<0.1	<0.1	1.1	0.2	<0.1	<0.1
Total	40.5	50.7	5.0	3.9	6.9	7.7
Year 6	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
Heavy Equipment Emissions	25.0	59.7	5.2	5.0	8.6	5.6
Worker Trip Emissions	19.4	1.5	0.1	0.1	<0.1	1.4
Architectural Coating Emissions	<0.1	<0.1	<0.1	<0.1	<0.1	1.9
Paving Off Gas Emissions	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fugitive Dust Emissions	<0.1	<0.1	2.1	0.3	<0.1	<0.1
Total	44.4	61.2	7.3	5.4	8.7	8.9

Emission factors in grams of pollutant per hour were multiplied by the estimated running time to calculate total grams of pollutant from each piece of equipment. Finally, these total grams of pollutant were converted to tons of pollutant. The following formula was used to calculate hourly emissions from non-road engine sources, including cranes, backhoes, and the like:

$$M_i = (N \times EF_i)$$

where: M_i = mass of emissions of i^{th} pollutant during inventory period

N = source population (units)

EF_i = average emissions of i^{th} pollutant per unit of use (e.g., grams per hour)

The total annual emissions for Alternative 1 are summarized in Table E-2.

Table E-2. Estimated Annual Emissions from Construction Equipment - Alternative 1

Year	Annual Emissions (tpy)					
	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
Year 1	17.8	44.3	4.3	3.1	5.4	4.4
Year 2	24.9	60.6	4.3	4.2	7.9	5.6
Year 3	16.1	39.4	2.8	2.7	5.1	3.7
Year 4	8.5	20.4	1.5	1.4	2.8	1.9
Year 5	20.4	49.1	3.8	3.7	6.8	4.6
Year 6	25.0	59.7	5.2	5.0	8.6	5.6

Source: USEPA 2005a and SQAQMD 1993

E.1.1.2 Construction Worker Vehicle Operations

Emissions due to construction worker vehicle use were included in the analysis. Emission factors for motor vehicles were conservatively calculated using the USEPA MOVES mobile emissions model. These emission factors were then multiplied by the vehicle operational hours to determine motor vehicle emissions. The analysis assumed conservatively that the worker's vehicle would drive 30 miles per day at an average speed of 35 miles per hour. The total annual emissions for Alternative 1 are summarized in Table E-3.

Table E-3. Estimated Annual Emissions from Construction Worker Vehicles - Alternative 1

Year	Annual Emissions (tpy)					
	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
Year 1	10.1	0.8	<0.1	<0.1	<0.1	0.7
Year 2	14.5	1.1	<0.1	<0.1	<0.1	1.0
Year 3	13.8	1.1	<0.1	<0.1	<0.1	1.0
Year 4	7.2	0.6	<0.1	<0.1	<0.1	0.5
Year 5	20.1	1.6	0.1	0.1	0.1	1.4
Year 6	19.4	1.5	0.1	0.1	<0.1	1.4

Source: USEPA 2012 and SQAQMD 1993

E.1.1.3 Emissions from Architectural Coatings

Emission factors relating emissions to total square footage to be built were used to estimate VOC emissions from architectural coating activities – primarily painting activities. For office space, the area to be painted was assumed to be approximately twice the heated area of the facility, and the dry film thickness was assumed to be three millimeters (mm). The following formula was used to calculate emissions from the painting of the facilities:

$$E = [(F \times G) / 1000] \times H$$

where: E = emissions of VOCs from architectural coatings

F = pounds of VOC emissions per gallon

G = total area to be coated (floor area x 2)

H = paint coverage.

A sample calculation for architectural coating VOC emissions during construction of an example facility is provided below:

$$\begin{aligned} \text{Floor area} &= 100,000 \text{ ft}^2 \\ E &= [(2.09) \text{ [lb/gallon]} / 400 \text{ [ft}^2\text{/gallon]} \times [(100,000 \text{ [ft}^2\text{)} \times 2)]] / 2,000 \text{ [lb/ton]} \\ &= 0.208 \text{ tons} \end{aligned}$$

The total annual emissions for Alternative 1 are summarized in Table E-4. In addition, estimated emissions from the potential construction are presented in Appendix E.2.

Table E-4. Annual VOC Emissions from Architectural Coatings - Alternative 1

Year	Annual VOC Emissions (tpy)
Year 1	2.3
Year 2	3.0
Year 3	2.8
Year 4	1.8
Year 5	4.3
Year 6	4.8

Source: SQAQMD 1993 and 9-VAC-5 Chapter 45 - Part II Article 5

E.1.1.4 Asphalt Curing Emissions

Asphalt paving would generate emissions from (1) asphalt curing, (2) operation of onsite paving equipment, and (3) operation of motor vehicles, including paving material delivery trucks and worker commuting vehicles. Because the emissions resulting from the operation of onsite paving equipment, trucks, and vehicles were included in the previous section, only asphalt curing-related emissions are discussed in this section. Asphalt curing-related VOC emissions were calculated based on the amount of paving for the onsite parking lot and proposed roadways. The following assumption was used in VOC emission calculations for asphalt curing (SQAQMD 1993):

$$E = \text{area paved} \times 2.62 \text{ lb VOC/acre}$$

A sample calculation is provided below:

$$\begin{aligned} \text{Paved area} &= 100 \text{ acres} \\ E &= 100 \text{ acres} \times 2.62 \text{ lb VOC/acre} / 2000 \text{ lb/ton} \\ &= 0.131 \text{ ton} \end{aligned}$$

Due to the minimal paving for all alternatives, negligible off gas emissions are anticipated.

E.1.1.5 Surface Disturbance

The quantity of dust emissions from construction operations is proportional to the area of land being worked and to the level of construction activity. The following assumptions were used in PM_{2.5} emission calculations for fugitive dust emissions (USEPA 1995 and USEPA 2005b).

$$E = \text{open area} \times EF \times \text{PM}_{10}/\text{TSP} \times \text{PM}_{2.5}/\text{PM}_{10} \times \text{capture fraction}$$

where: open area = number of acres open

$$\begin{aligned}
 EF &= 80 \text{ lb TSP/acre} \\
 \text{PM}_{10}/\text{TSP} &= 0.45 \text{ lb PM}_{10}/\text{lb TSP} \\
 \text{TSP} &= \text{total suspended particulates} \\
 \text{PM}_{2.5}/\text{PM}_{10} &= 0.15 \text{ lb PM}_{2.5}/\text{lb PM}_{10} \\
 \text{Capture fraction} &= 0.5
 \end{aligned}$$

A sample calculation is provided below:

$$\text{Disturbed area} = 100 \text{ acres}$$

$$\begin{aligned}
 E &= 100 \text{ ac} \times 80 \text{ lb TSP /acre} \times 0.45 \text{ lb PM}_{10}/\text{lb TSP} \times 0.15 \text{ lb PM}_{2.5}/\text{lb PM}_{10} \times 2000 \text{ lb/ton} \\
 &= 1.35 \text{ tons}
 \end{aligned}$$

The total annual emissions for Alternative 1 are summarized in Table E-5.

Table E-5. Annual PM_{2.5} Emissions from Surface Disturbance - Alternative 1

Year	Annual emissions (tpy)	
	PM ₁₀	PM _{2.5}
Year 1	3.6	0.5
Year 2	5.3	0.8
Year 3	1.8	0.3
Year 4	1.3	0.2
Year 5	1.1	0.2
Year 6	2.1	0.3

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E.2 EMISSIONS CALCULATIONS

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Table E-6. Project Areas and Durations

Project Name	Year	Area			Duration (days)		
		Clearing [Acres]	Building [Sqft]	Paving [Acres]	Clearing	Building	Paving
ST 01-New PX - Clearing	1	24.37	0	0	20	0	0
ST 01-New PX - Building	1	0	270,000	0	0	336	0
ST 01-New PX - Paving	1	0	0	16.78	0	0	9
ST 02-PAL - Clearing	1	5.41	0	0	10	0	0
ST 02-PAL - Building	1	0	103,402	0	0	276	0
ST 02-PAL - Paving	1	0	0	2.05	0	0	2
ST 03-National Intrepid Center of Excellence - Clearing	1	2.81	0	0	9	0	0
ST 03-National Intrepid Center of Excellence - Building	1	0	18,078	0	0	123	0
ST 03-National Intrepid Center of Excellence - Paving	1	0	0	0.57	0	0	1
ST 04-Mulligan Road Phase II - Clearing	1	32.06	0	0	23	0	0
ST 04-Mulligan Road Phase II - Paving	1	0	0	20.04	0	0	10
ST 05-Fisher House 1 - Clearing	1	1.8	0	0	8	0	0
ST 05-Fisher House 1 - Building	1	0	10,000	0	0	108	0
ST 05-Fisher House 1 - Paving	1	0	0	0.64	0	0	1
ST 06-USO Family Center - Clearing	1	3.46	0	0	9	0	0
ST 06-USO Family Center - Building	1	0	25,000	0	0	135	0
ST 06-USO Family Center - Paving	1	0	0	0.59	0	0	1
ST 07-DAAF Firehouse Expansion - Clearing	1	0.43	0	0	8	0	0
ST 07-DAAF Firehouse Expansion - Building	1	0	4,050	0	0	97	0
ST 07-DAAF Firehouse Expansion - Paving	1	0	0	0.01	0	0	1
ST 08-CDC 144 - Clearing	1	3.69	0	0	9	0	0
ST 08-CDC 144 - Building	1	0	13,020	0	0	113	0
ST 08-CDC 144 - Paving	1	0	0	1.05	0	0	1
ST 09-Family Travel Camp Phase 1 - Clearing	1	9.66	0	0	12	0	0
ST 09-Family Travel Camp Phase 1 - Building	1	0	1,658	0	0	93	0
ST 09-Family Travel Camp Phase 1 - Paving	1	0	0	1.6	0	0	1
ST 11-CDC 1 - Clearing	2	3.21	0	0	9	0	0
ST 11-CDC 1 - Building	2	0	10,640	0	0	109	0
ST 11-CDC 1 - Paving	2	0	0	2.32	0	0	2
ST 12-CDC 2 - Clearing	2	0.5	0	0	8	0	0
ST 12-CDC 2 - Building	2	0	10,640	0	0	109	0
ST 12-CDC 2 - Paving	2	0	0	0.22	0	0	1
ST 13-Access Road & Control Point - Lieber Gate - Clearing	2	8.02	0	0	11	0	0
ST 13-Access Road & Control Point - Lieber Gate - Building	2	0	1,500	0	0	93	0
ST 13-Access Road & Control Point - Lieber Gate - Paving	2	0	0	6.01	0	0	3
ST 14-Regional Stormwater Management Facility - Clearing	2	3.51	0	0	9	0	0
ST 14-Regional Stormwater Management Facility - Paving	2	0	0	0.23	0	0	1

Project Name	Year	Area			Duration (days)		
		Clearing [Acres]	Building [Sqft]	Paving [Acres]	Clearing	Building	Paving
ST 15-AAFES Car Wash - Clearing	2	0.13	0	0	8	0	0
ST 15-AAFES Car Wash - Building	2	0	1,350	0	0	92	0
ST 15-AAFES Car Wash - Paving	2	0	0	0.1	0	0	1
ST 16-PX - Demolition	2	3.2	0	0	30	0	0
ST 17-Reconfigure Golf Course - Clearing	2	33.86	0	0	60	0	0
ST 17-Reconfigure Golf Course - Paving	2	0	0	1.3	0	0	30
ST 18-NMUSA -Roads and Infrastructure - Clearing	2	16.55	0	0	60	0	0
ST 18-NMUSA -Roads and Infrastructure - Paving	2	0	0	8.28	0	0	90
ST 19-INSCOM Phase 1 - Clearing	2	5.49	0	0	10	0	0
ST 19-INSCOM Phase 1 - Building	2	0	420,000	0	0	354	0
ST 19-INSCOM Phase 1 - Paving	2	0	0	1.08	0	0	1
ST 20-South Post Fire Station - Clearing	2	1.46	0	0	8	0	0
ST 20-South Post Fire Station - Building	2	0	10,297	0	0	109	0
ST 20-South Post Fire Station - Paving	2	0	0	0.07	0	0	1
ST 21-AAFES Car Care Center - Clearing	2	0.16	0	0	8	0	0
ST 21-AAFES Car Care Center - Building	2	0	9,000	0	0	106	0
ST 21-AAFES Car Care Center Station - Paving	2	0	0	0.01	0	0	1
ST 22-Pet Care Center - Clearing	2	1	0	0	8	0	0
ST 22-Pet Care Center - Building	2	0	5,200	0	0	99	0
ST 22-Pet Care Center Station - Paving	2	0	0	0.2	0	0	1
ST 23-NGA Canine Training/ Rest Facility - Clearing	2	0.49	0	0	8	0	0
ST 23-NGA Canine Training/ Rest Facility - Building	2	0	1,200	0	0	92	0
ST 23-NGA Canine Training/ Rest Facility Station - Paving	2	0	0	0.03	0	0	1
ST 24-Fairfax County School Expansion - Clearing	2	6.25	0	0	11	0	0
ST 24-Fairfax County School Expansion - Building	2	0	98,400	0	0	267	0
ST 24-Fairfax County School Expansion - Paving	2	0	0	2.01	0	0	2
ST 25-Casual Dining Restaurant - Clearing	3	0.2	0	0	8	0	0
ST 25-Casual Dining Restaurant - Building	3	0	6,500	0	0	102	0
ST 25-Casual Dining Restaurant - Paving	3	0	0	0.15	0	0	1
ST 26-INSCOM Phase 2 - Clearing	3	5.49	0	0	10	0	0
ST 26-INSCOM Phase 2 - Building	3	0	188,000	0	0	354	0
ST 26-INSCOM Phase 2 - Paving	3	0	0	1.08	0	0	1
ST 27-NMUSA Phase 1 - Clearing	3	16.55	0	0	16	0	0
ST 27-NMUSA Phase 1 - Building	3	0	195,130	0	0	344	0
ST 27-NMUSA Phase 1 - Paving	3	0	0	8.28	0	0	5
ST 28-Main Post Commissary - Clearing	3	19.44	0	0	17	0	0
ST 28-Main Post Commissary - Building	3	0	132,000	0	0	328	0
ST 28-Main Post Commissary - Paving	3	0	0	2.18	0	0	2
ST 29-DLA Visitor Control Center - Clearing	3	0.46	0	0	8	0	0

Project Name	Year	Area			Duration (days)		
		Clearing [Acres]	Building [Sqft]	Paving [Acres]	Clearing	Building	Paving
ST 29-DLA Visitor Control Center - Building	3	0	2,960	0	0	95	0
ST 29-DLA Visitor Control Center - Paving	3	0	0	0.35	0	0	1
ST 30-Fisher House 2 - Clearing	3	1.8	0	0	8	0	0
ST 30-Fisher House 2 - Building	3	0	10,000	0	0	108	0
ST 30-Fisher House 2 - Paving	3	0	0	0.5	0	0	1
ST 31-Family Travel Camp Phase 2 - Clearing	3	1.26	0	0	8	0	0
ST 31-Family Travel Camp Phase 2 - Paving	3	0	0	0.94	0	0	1
ST 32-249th Infantry HQ - Clearing	4	10.52	0	0	13	0	0
ST 32-249th Infantry HQ - Building	4	0	81,783	0	0	237	0
ST 32-249th Infantry HQ - Paving	4	0	0	4.11	0	0	3
ST 33-INSCOM Phase 3 - Clearing	4	5.49	0	0	10	0	0
ST 33-INSCOM Phase 3 - Building	4	0	194,000	0	0	354	0
ST 33-INSCOM Phase 3 - Paving	4	0	0	1.08	0	0	1
ST 34-NMUSA Phase 2 - Clearing	4	16.55	0	0	16	0	0
ST 34-NMUSA Phase 2 - Building	4	0	36,667	0	0	156	0
ST 34-NMUSA Phase 2 - Paving	4	0	0	8.28	0	0	5
ST 35-Retail Fuel Point - Clearing	4	1.04	0	0	8	0	0
ST 35-Retail Fuel Point - Building	4	0	784	0	0	91	0
ST 35-Retail Fuel Point - Paving	4	0	0	0.78	0	0	1
ST 36-29th Infantry HQ - Clearing	5	7.37	0	0	11	0	0
ST 36-29th Infantry HQ - Building	5	0	33,258	0	0	150	0
ST 36-29th Infantry HQ - Paving	5	0	0	0.76	0	0	1
ST 37-Medical Office Building - Clearing	5	0.6	0	0	8	0	0
ST 37-Medical Office Building - Building	5	0	21,948	0	0	130	0
ST 37-Medical Office Building - Paving	5	0	0	0.45	0	0	1
ST 38-NMUSA Phase 3 - Clearing	5	16.55	0	0	16	0	0
ST 38-NMUSA Phase 3 - Building	5	0	36,667	0	0	156	0
ST 38-NMUSA Phase 3 - Paving	5	0	0	8.28	0	0	5
ST 39-Multipurpose Fields - Clearing	5	2.35	0	0	9	0	0
ST 39-Multipurpose Fields - Paving	5	0	0	0.36	0	0	30
ST 40-DLA Parking Garage - Clearing	5	1.2	0	0	8	0	0
ST 40-DLA Parking Garage - Building	5	0	700,000	0	0	356	0
ST 40-DLA Parking Garage - Paving	5	0	0	0.4	0	0	1
ST 41-NMUSA Phase 4 - Clearing	6	16.55	0	0	16	0	0
ST 41-NMUSA Phase 4 - Building	6	0	36,667	0	0	156	0
ST 41-NMUSA Phase 4 - Paving	6	0	0	8.28	0	0	5
ST 42-Unaccompanied Enlisted Personnel Barracks - Clearing	6	0.61	0	0	8	0	0
ST 42-Unaccompanied Enlisted Personnel Barracks - Building	6	0	103,960	0	0	277	0
ST 42-Unaccompanied Enlisted Personnel Barracks - Paving	6	0	0	0.2	0	0	1

Project Name	Year	Area			Duration (days)		
		Clearing [Acres]	Building [Sqft]	Paving [Acres]	Clearing	Building	Paving
ST 43-OSEG Training Compound - Clearing	6	9.02	0	0	12	0	0
ST 43-OSEG Training Compound - Building	6	0	91,531	0	0	255	0
ST 43-OSEG Training Compound - Paving	6	0	0	3.15	0	0	2
ST 44-Baseball Field Replacement - Clearing	6	0.92	0	0	8	0	0
ST 45-Secure Admin Facility - Clearing	6	3.85	0	0	2	0	0
ST 45-Secure Admin Facility - Building	6	0	107,193	0	0	283	0
ST 45-Secure Admin Facility - Paving	6	0	0	0.35	0	0	1
ST 46-INSCOM Phase 4 - Clearing	6	5.49	0	0	10	0	0
ST 46-INSCOM Phase 4 - Building	6	0	105,000	0	0	279	0
ST 46-INSCOM Phase 4 - Paving	6	0	0	1.08	0	0	1
ST 47-Religious Education Center - Clearing	6	1.12	0	0	8	0	0
ST 47-Religious Education Center - Building	6	0	18,093	0	0	123	0
ST 47-Religious Education Center - Paving	6	0	0	0.63	0	0	1
ST 48-INSCOM Warehouse - Clearing	6	6.85	0	0	11	0	0
ST 48-INSCOM Warehouse - Building	6	0	57,116	0	0	193	0
ST 48-INSCOM Warehouse - Paving	6	0	0	0.56	0	0	1
ST 49-911th Engineering Company Operations Complex - Clearing	6	6.85	0	0	11	0	0
ST 49-911th Engineering Company Operations Complex - Building	6	0	39,810	0	0	162	0
ST 49-911th Engineering Company Operations Complex - Paving	6	0	0	0.67	0	0	1
ST 50-Vehicle Maintenance Shop - Clearing	6	0.35	0	0	8	0	0
ST 50-Vehicle Maintenance Shop - Building	6	0	25,565	0	0	136	0
ST 50-Vehicle Maintenance Shop - Paving	6	0	0	0.24	0	0	1
ST 51-Network Enterprise Center Information Systems Facility - Clearing	6	0.85	0	0	8	0	0
ST 51-Network Enterprise Center Information Systems Facility - Building	6	0	75,000	0	0	225	0
ST 51-Network Enterprise Center Information Systems Facility - Paving	6	0	0	0.11	0	0	1
ST 52-DLA HQ Building - Clearing	6	3.86	0	0	9	0	0
ST 52-DLA HQ Building - Building	6	0	267,000	0	0	355	0
ST 52-DLA HQ Building - Paving	6	0	0	1.82	0	0	1

Table E-7. Annual Equipment Use

Equipment Type	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Generator Sets	11,319	14,966	9,317	5,866	13,020	19,593
Air Compressors	11,319	14,966	9,317	5,866	13,020	19,593
Pavers	392	945	84	70	266	112
Plate Compactors	18,056	23,308	18,904	9,576	26,424	32,008
Rollers	1,316	3,192	238	210	602	294
Scrapers	1,519	3,416	756	532	476	889
Cement & Mortar Mixers	31,206	39,844	32,998	16,688	45,976	55,902
Cranes	31,206	39,844	32,998	16,688	45,976	55,902
Graders	1,519	3,416	756	532	476	889
Off-highway Trucks	33,117	44,205	33,838	17,290	46,718	56,903
Tractors/Loaders/Backhoes	32,725	43,260	33,754	17,220	46,452	56,791
Crawler Tractor/Dozers	1,519	3,416	756	532	476	889

Table E-8. Heavy Equipment Emissions

Project	CO	NO_x	PM₁₀	PM_{2.5}	SO₂	VOC
ST 01-New PX - Clearing	0.40	1.09	0.40	0.09	0.16	0.12
ST 01-New PX - Building	7.10	17.71	1.25	1.21	2.10	1.71
ST 01-New PX - Paving	0.11	0.22	0.02	0.02	0.03	0.02
ST 02-PAL - Clearing	0.07	0.18	0.07	0.01	0.03	0.02
ST 02-PAL - Building	3.66	9.27	0.65	0.63	1.09	0.90
ST 02-PAL - Paving	0.01	0.02	<0.01	<0.01	<0.01	<0.01
ST 03-National Intrepid Center of Excellence - Clearing	0.06	0.16	0.06	0.01	0.02	0.02
ST 03-National Intrepid Center of Excellence - Building	0.97	2.35	0.17	0.17	0.29	0.23
ST 03-National Intrepid Center of Excellence - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 04-Mulligan Road Phase II - Clearing	0.61	1.67	0.61	0.13	0.24	0.19
ST 04-Mulligan Road Phase II - Paving	0.16	0.33	0.03	0.03	0.05	0.03
ST 05-Fisher House 1 - Clearing	0.05	0.15	0.05	0.01	0.02	0.02
ST 05-Fisher House 1 - Building	0.85	2.06	0.15	0.15	0.25	0.20
ST 05-Fisher House 1 - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 06-USO Family Center - Clearing	0.06	0.16	0.06	0.01	0.02	0.02
ST 06-USO Family Center - Building	1.06	2.58	0.19	0.18	0.31	0.25
ST 06-USO Family Center - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 07-DAAF Firehouse Expansion - Clearing	0.05	0.15	0.05	0.01	0.02	0.02
ST 07-DAAF Firehouse Expansion - Building	0.76	1.85	0.13	0.13	0.23	0.18
ST 07-DAAF Firehouse Expansion - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 08-CDC 144 - Clearing	0.06	0.16	0.06	0.01	0.02	0.02
ST 08-CDC 144 - Building	0.89	2.16	0.16	0.15	0.26	0.21
ST 08-CDC 144 - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 09-Family Travel Camp Phase 1 - Clearing	0.08	0.22	0.08	0.02	0.03	0.02
ST 09-Family Travel Camp Phase 1 - Building	0.73	1.78	0.13	0.12	0.22	0.17
ST 09-Family Travel Camp Phase 1 - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 11-CDC 1 - Clearing	0.08	0.18	0.01	0.01	0.03	0.01
ST 11-CDC 1 - Building	0.84	2.01	0.15	0.14	0.25	0.19
ST 11-CDC 1 - Paving	0.01	0.02	<0.01	<0.01	<0.01	<0.01
ST 12-CDC 2 - Clearing	0.07	0.16	0.01	0.01	0.03	0.01
ST 12-CDC 2 - Building	0.84	2.01	0.15	0.14	0.25	0.19
ST 12-CDC 2 - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01

Project	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
ST 13-- Lieber Gate - Clearing	0.09	0.22	0.02	0.01	0.03	0.02
ST 13- Lieber Gate - Building	0.71	1.72	0.13	0.12	0.22	0.16
ST 13-- Lieber Gate - Paving	0.02	0.04	<0.01	<0.01	0.01	<0.01
ST 14- Stormwater Management Facility - Clearing	0.08	0.18	0.01	0.01	0.03	0.01
ST 14- Stormwater Management Facility - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 15-AAFES Car Wash - Clearing	0.07	0.16	0.01	0.01	0.03	0.01
ST 15-AAFES Car Wash - Building	0.71	1.70	0.12	0.12	0.21	0.16
ST 15-AAFES Car Wash - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 16-PX - Demolition	0.26	0.61	0.04	0.04	0.09	0.04
ST 17-Reconfigure Golf Course - Clearing	2.06	4.89	0.33	0.32	0.75	0.36
ST 17-Reconfigure Golf Course - Paving	0.11	0.24	0.02	0.02	0.03	0.02
ST 18-NMUSA -Roads and Infrastructure - Clearing	1.03	2.45	0.17	0.16	0.38	0.18
ST 18-NMUSA -Roads and Infrastructure - Paving	0.51	1.07	0.09	0.09	0.16	0.09
ST 19-INSCOM Phase 1 - Clearing	0.09	0.20	0.01	0.01	0.03	0.01
ST 19-INSCOM Phase 1 - Building	11.81	29.40	2.08	2.02	3.61	2.82
ST 19-INSCOM Phase 1 - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 20-South Post Fire Station - Clearing	0.07	0.16	0.01	0.01	0.03	0.01
ST 20-South Post Fire Station - Building	0.84	2.01	0.15	0.14	0.25	0.19
ST 20-South Post Fire Station - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 21-AAFES Car Care Center - Clearing	0.07	0.16	0.01	0.01	0.03	0.01
ST 21-AAFES Car Care Center - Building	0.81	1.96	0.14	0.14	0.25	0.19
ST 21-AAFES Car Care Center Station - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 22-Pet Care Center - Clearing	0.07	0.16	0.01	0.01	0.03	0.01
ST 22-Pet Care Center - Building	0.76	1.83	0.13	0.13	0.23	0.18
ST 22-Pet Care Center Station - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 23-NGA Canine Training/ Rest Facility - Clearing	0.07	0.16	0.01	0.01	0.03	0.01
ST 23-NGA Canine Training/ Rest Facility - Building	0.71	1.70	0.12	0.12	0.21	0.16
ST 23-NGA Canine Training/ Facility Station - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 24-Fairfax County School Expansion - Clearing	0.09	0.22	0.02	0.01	0.03	0.02
ST 24-Fairfax County School Expansion - Building	2.05	4.93	0.36	0.35	0.62	0.47
ST 24-Fairfax County School Expansion - Paving	0.01	0.02	<0.01	<0.01	<0.01	<0.01
ST 25-Casual Dining Restaurant - Clearing	0.07	0.15	0.01	0.01	0.03	0.01
ST 25-Casual Dining Restaurant - Building	0.76	1.82	0.13	0.13	0.24	0.17
ST 25-Casual Dining Restaurant - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 26-INSCOM Phase 2 - Clearing	0.08	0.19	0.01	0.01	0.03	0.01
ST 26-INSCOM Phase 2 - Building	4.42	10.98	0.78	0.76	1.39	1.05
ST 26-INSCOM Phase 2 - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 27-NMUSA Phase 1 - Clearing	0.26	0.61	0.04	0.04	0.10	0.04
ST 27-NMUSA Phase 1 - Building	4.30	10.67	0.76	0.73	1.36	1.02
ST 27-NMUSA Phase 1 - Paving	0.03	0.06	<0.01	<0.01	0.01	<0.01
ST 28-Main Post Commissary - Clearing	0.28	0.65	0.05	0.04	0.11	0.05
ST 28-Main Post Commissary - Building	4.10	10.18	0.72	0.70	1.29	0.97
ST 28-Main Post Commissary - Paving	0.01	0.02	<0.01	<0.01	<0.01	<0.01
ST 29-DLA Visitor Control Center - Clearing	0.07	0.15	0.01	0.01	0.03	0.01
ST 29-DLA Visitor Control Center - Building	0.71	1.69	0.12	0.12	0.22	0.16
ST 29-DLA Visitor Control Center - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 30-Fisher House 2 - Clearing	0.07	0.15	0.01	0.01	0.03	0.01
ST 30-Fisher House 2 - Building	0.81	1.92	0.14	0.14	0.25	0.18
ST 30-Fisher House 2 - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01

Project	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
ST 31-Family Travel Camp Phase 2 - Clearing	0.07	0.15	0.01	0.01	0.03	0.01
ST 31-Family Travel Camp Phase 2 - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 32-249th Infantry HQ - Clearing	0.21	0.47	0.03	0.03	0.08	0.03
ST 32-249th Infantry HQ - Building	1.74	4.08	0.30	0.29	0.55	0.39
ST 32-249th Infantry HQ - Paving	0.01	0.02	<0.01	<0.01	<0.01	<0.01
ST 33-INSCOM Phase 3 - Clearing	0.08	0.18	0.01	0.01	0.03	0.01
ST 33-INSCOM Phase 3 - Building	4.31	10.55	0.76	0.73	1.39	1.00
ST 33-INSCOM Phase 3 - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 34-NMUSA Phase 2 - Clearing	0.26	0.58	0.04	0.04	0.10	0.04
ST 34-NMUSA Phase 2 - Building	1.14	2.69	0.20	0.19	0.36	0.25
ST 34-NMUSA Phase 2 - Paving	0.03	0.05	<0.01	<0.01	0.01	<0.01
ST 35-Retail Fuel Point - Clearing	0.06	0.14	0.01	0.01	0.03	0.01
ST 35-Retail Fuel Point - Building	0.67	1.57	0.12	0.11	0.21	0.15
ST 35-Retail Fuel Point - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 36-29th Infantry HQ - Clearing	0.08	0.18	0.02	0.02	0.03	0.01
ST 36-29th Infantry HQ - Building	1.06	2.48	0.20	0.19	0.35	0.23
ST 36-29th Infantry HQ - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 37-Medical Office Building - Clearing	0.06	0.13	0.01	0.01	0.02	0.01
ST 37-Medical Office Building - Building	0.92	2.15	0.17	0.17	0.30	0.20
ST 37-Medical Office Building - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 38-NMUSA Phase 3 - Clearing	0.24	0.53	0.05	0.05	0.10	0.04
ST 38-NMUSA Phase 3 - Building	1.11	2.58	0.20	0.20	0.36	0.24
ST 38-NMUSA Phase 3 - Paving	0.03	0.05	<0.01	<0.01	0.01	<0.01
ST 39-Multipurpose Fields - Clearing	0.07	0.15	0.01	0.01	0.03	0.01
ST 39-Multipurpose Fields - Paving	0.10	0.20	0.02	0.02	0.03	0.02
ST 40-DLA Parking Garage - Clearing	0.06	0.13	0.01	0.01	0.02	0.01
ST 40-DLA Parking Garage - Building	16.68	40.52	3.13	3.03	5.55	3.82
ST 40-DLA Parking Garage - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 41-NMUSA Phase 4 - Clearing	0.21	0.49	0.05	0.05	0.10	0.04
ST 41-NMUSA Phase 4 - Building	1.06	2.47	0.21	0.21	0.35	0.23
ST 41-NMUSA Phase 4 - Paving	0.02	0.05	0.01	<0.01	0.01	<0.01
ST 42-Unaccompanied Personnel Barracks - Clearing	0.05	0.12	0.01	0.01	0.02	0.01
ST 42-Unaccompanied Personnel Barracks - Building	3.07	7.48	0.64	0.62	1.06	0.70
ST 42-Unaccompanied Personnel Barracks - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 43-OSEG Training Compound - Clearing	0.08	0.18	0.02	0.02	0.04	0.01
ST 43-OSEG Training Compound - Building	1.73	4.03	0.35	0.34	0.58	0.38
ST 43-OSEG Training Compound - Paving	0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 44-Baseball Field Replacement - Clearing	0.05	0.12	0.01	0.01	0.02	0.01
ST 45-Secure Admin Facility - Clearing	0.01	0.03	<0.01	<0.01	0.01	<0.01
ST 45-Secure Admin Facility - Building	3.14	7.65	0.65	0.63	1.08	0.72
ST 45-Secure Admin Facility - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 46-INSCOM Phase 4 - Clearing	0.07	0.15	0.02	0.02	0.03	0.01
ST 46-INSCOM Phase 4 - Building	3.09	7.54	0.64	0.62	1.07	0.71
ST 46-INSCOM Phase 4 - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 47-Religious Education Center - Clearing	0.05	0.12	0.01	0.01	0.02	0.01
ST 47-Religious Education Center - Building	0.83	1.95	0.17	0.16	0.28	0.18
ST 47-Religious Education Center - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 48-INSCOM Warehouse - Clearing	0.07	0.17	0.02	0.02	0.03	0.01
ST 48-INSCOM Warehouse - Building	1.31	3.05	0.26	0.26	0.44	0.29

Project	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOC
ST 48-INSCOM Warehouse - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 49-911th ECO Complex - Clearing	0.07	0.17	0.02	0.02	0.03	0.01
ST 49-911th ECO Complex - Building	1.10	2.56	0.22	0.21	0.37	0.24
ST 49-911th ECO Complex - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 50-Vehicle Maintenance Shop - Clearing	0.05	0.12	0.01	0.01	0.02	0.01
ST 50-Vehicle Maintenance Shop - Building	0.92	2.15	0.19	0.18	0.31	0.20
ST 50-Vehicle Maintenance Shop - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 51-NECIS Facility - Clearing	0.05	0.12	0.01	0.01	0.02	0.01
ST 51- NECIS Facility - Building	1.53	3.56	0.31	0.30	0.51	0.33
ST 51- NECIS Facility - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
ST 52-DLA HQ Building - Clearing	0.06	0.14	0.02	0.01	0.03	0.01
ST 52-DLA HQ Building - Building	6.34	15.21	1.30	1.26	2.17	1.43
ST 52-DLA HQ Building - Paving	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Total Non-Road	112.66	273.60	21.92	20.19	36.58	25.71

Sources: USEPA 2012 and SQAQMD 1993

Table E-9. Architectural Coating Emissions (Paint)

Project	Floor Area	Wall Surface	VOC [tons]
ST 01-New PX - Building	270,000	540,000	1.41
ST 02-PAL - Building	103,402	206,804	0.54
ST 03-National Intrepid Center of Excellence - Building	18,078	36,156	0.09
ST 05-Fisher House 1 - Building	10,000	20,000	0.05
ST 06-USO Family Center - Building	25,000	50,000	0.13
ST 07-DAAF Firehouse Expansion - Building	4,050	8,100	0.02
ST 08-CDC 144 - Building	13,020	26,040	0.07
ST 09-Family Travel Camp Phase 1 - Building	1,658	3,316	0.01
ST 11-CDC 1 - Building	10,640	21,280	0.06
ST 12-CDC 2 - Building	10,640	21,280	0.06
ST 13-Access Road & Control Point - Lieber Gate - Building	1,500	3,000	0.01
ST 15-AAFES Car Wash - Building	1,350	2,700	0.01
ST 19-INSCOM Phase 1 - Building	420,000	840,000	2.19
ST 20-South Post Fire Station - Building	10,297	20,594	0.05
ST 21-AAFES Car Care Center - Building	9,000	18,000	0.05
ST 22-Pet Care Center - Building	5,200	10,400	0.03
ST 23-NGA Canine Training/ Rest Facility - Building	1,200	2,400	0.01
ST 24-Fairfax County School Expansion - Building	98,400	196,800	0.51
ST 25-Casual Dining Restaurant - Building	6,500	13,000	0.03
ST 26-INSCOM Phase 2 - Building	188,000	376,000	0.98
ST 27-NMUSA Phase 1 - Building	195,130	390,260	1.02
ST 28-Main Post Commissary - Building	132,000	264,000	0.69
ST 29-DLA Visitor Control Center - Building	2,960	5,920	0.02
ST 30-Fisher House 2 - Building	10,000	20,000	0.05
ST 32-249th Infantry HQ - Building	81,783	163,566	0.43
ST 33-INSCOM Phase 3 - Building	194,000	388,000	1.01
ST 34-NMUSA Phase 2 - Building	36,667	73,334	0.19
ST 35-Retail Fuel Point - Building	784	1,568	0.00
ST 36-29th Infantry HQ - Building	33,258	66,516	0.17
ST 37-Medical Office Building - Building	21,948	43,896	0.11
ST 38-NMUSA Phase 3 - Building	36,667	73,334	0.19
ST 40-DLA Parking Garage - Building	700,000	1,400,000	3.66
ST 41-NMUSA Phase 4 - Building	36,667	73,334	0.19
ST 42-Unaccompanied Enlisted Personnel Barracks - Building	103,960	207,920	0.54
ST 43-OSEG Training Compound - Building	91,531	183,062	0.48
ST 45-Secure Admin Facility - Building	107,193	214,386	0.56
ST 46-INSCOM Phase 4 - Building	105,000	210,000	0.55
ST 47-Religious Education Center - Building	18,093	36,186	0.09
ST 48-INSCOM Warehouse - Building	57,116	114,232	0.30
ST 49-911th Engineering Company Operations Complex - Building	39,810	79,620	0.21
ST 50-Vehicle Maintenance Shop - Building	25,565	51,130	0.13
ST 51-Network Enterprise Center Information Systems Facility - Building	75,000	150,000	0.39
ST 52-DLA HQ Building - Building	267,000	534,000	1.40

Note: EFVOC = 2.09 lbs/gallon x 2.5 gallons/1,000 sqft = 5.225 lbs/1,000 sqft

Sources: SQAQMD 1993 and 9 VAC 5 Chapter 45, Article 5

Table E-10. Paving Off-Gas Emissions

Project	Paved Area	VOC [tons]
ST 01-New PX - Building	16.78	0.02
ST 02-PAL - Building	2.05	<0.01
ST 03-National Intrepid Center of Excellence - Building	0.57	<0.01
ST 05-Fisher House 1 - Building	20.04	0.03
ST 06-USO Family Center - Building	0.64	<0.01
ST 07-DAAF Firehouse Expansion - Building	0.59	<0.01
ST 08-CDC 144 - Building	0.01	<0.01
ST 09-Family Travel Camp Phase 1 - Building	1.05	<0.01
ST 11-CDC 1 - Building	1.60	<0.01
ST 12-CDC 2 - Building	2.32	<0.01
ST 13-Access Road & Control Point - Lieber Gate - Building	0.22	<0.01
ST 15-AAFES Car Wash - Building	6.01	0.01
ST 19-INSCOM Phase 1 - Building	0.23	<0.01
ST 20-South Post Fire Station - Building	0.10	<0.01
ST 21-AAFES Car Care Center - Building	1.30	<0.01
ST 22-Pet Care Center - Building	8.28	<0.01
ST 23-NGA Canine Training/ Rest Facility - Building	1.08	<0.01
ST 24-Fairfax County School Expansion - Building	0.07	<0.01
ST 25-Casual Dining Restaurant - Building	0.01	<0.01
ST 26-INSCOM Phase 2 - Building	0.20	<0.01
ST 27-NMUSA Phase 1 - Building	0.03	<0.01
ST 28-Main Post Commissary - Building	2.01	<0.01
ST 29-DLA Visitor Control Center - Building	0.15	<0.01
ST 30-Fisher House 2 - Building	1.08	<0.01
ST 32-249th Infantry HQ - Building	8.28	0.01
ST 33-INSCOM Phase 3 - Building	2.18	<0.01
ST 34-NMUSA Phase 2 - Building	0.35	<0.01
ST 35-Retail Fuel Point - Building	0.50	<0.01
ST 36-29th Infantry HQ - Building	0.94	<0.01
ST 37-Medical Office Building - Building	4.11	0.01
ST 38-NMUSA Phase 3 - Building	1.08	<0.01
ST 40-DLA Parking Garage - Building	8.28	0.01
ST 41-NMUSA Phase 4 - Building	0.78	<0.01
ST 42-Unaccompanied Enlisted Personnel Barracks - Building	0.76	<0.01
ST 43-OSEG Training Compound - Building	0.45	<0.01
ST 45-Secure Admin Facility - Building	8.28	0.01
ST 46-INSCOM Phase 4 - Building	0.36	<0.01
ST 47-Religious Education Center - Building	0.40	<0.01
ST 48-INSCOM Warehouse - Building	8.28	0.01
ST 49-911th Engineering Company Operations Complex - Building	0.20	<0.01
ST 50-Vehicle Maintenance Shop - Building	3.15	<0.01
ST 51-Network Enterprise Center Information Systems Facility - Building	0.35	<0.01
ST 52-DLA HQ Building - Building	1.08	<0.01

Note: EFVOC = 2.62 lbs/1,000 acre

Table E-11. Fugitive Dust Emissions

Project	Duration of Grading [days]	Cleared Area [acres]	PM ₁₀ [tons]	PM _{2.5} [tons]
ST 01-New PX - Building	20	24.37	1.10	0.16
ST 02-PAL - Building	10	5.41	0.19	0.03
ST 03-National Intrepid Center of Excellence - Building	9	2.81	0.10	0.01
ST 05-Fisher House 1 - Building	23	32.06	1.53	0.23
ST 06-USO Family Center - Building	8	1.80	0.06	0.01
ST 07-DAAF Firehouse Expansion - Building	9	3.46	0.12	0.02
ST 08-CDC 144 - Building	8	0.43	0.01	<0.01
ST 09-Family Travel Camp Phase 1 - Building	9	3.69	0.13	0.02
ST 11-CDC 1 - Building	12	9.66	0.37	0.05
ST 12-CDC 2 - Building	9	3.21	0.11	0.02
ST 13-Access Road & Control Point - Lieber Gate - Building	8	0.50	0.02	<0.01
ST 15-AAFES Car Wash - Building	11	8.02	0.30	0.04
ST 19-INSCOM Phase 1 - Building	9	3.51	0.12	0.02
ST 20-South Post Fire Station - Building	8	0.13	<0.01	<0.01
ST 21-AAFES Car Care Center - Building	30	3.20	0.17	0.03
ST 22-Pet Care Center - Building	60	33.86	2.74	0.41
ST 23-NGA Canine Training/ Rest Facility - Building	60	16.55	1.34	0.20
ST 24-Fairfax County School Expansion - Building	10	5.49	0.20	0.03
ST 25-Casual Dining Restaurant - Building	8	1.46	0.05	0.01
ST 26-INSCOM Phase 2 - Building	8	0.16	0.01	<0.01
ST 27-NMUSA Phase 1 - Building	8	1.00	0.03	0.01
ST 28-Main Post Commissary - Building	8	0.49	0.02	<0.01
ST 29-DLA Visitor Control Center - Building	11	6.25	0.23	0.03
ST 30-Fisher House 2 - Building	8	0.20	0.01	<0.01
ST 32-249th Infantry HQ - Building	10	5.49	0.20	0.03
ST 33-INSCOM Phase 3 - Building	16	16.55	0.69	0.10
ST 34-NMUSA Phase 2 - Building	17	19.44	0.82	0.12
ST 35-Retail Fuel Point - Building	8	0.46	0.02	<0.01
ST 36-29th Infantry HQ - Building	8	1.80	0.06	0.01
ST 37-Medical Office Building - Building	8	1.26	0.04	0.01
ST 38-NMUSA Phase 3 - Building	13	10.52	0.41	0.06
ST 40-DLA Parking Garage - Building	10	5.49	0.20	0.03
ST 41-NMUSA Phase 4 - Building	16	16.55	0.69	0.10
ST 42-Unaccompanied Personnel Barracks - Building	8	1.04	0.04	0.01
ST 43-OSEG Training Compound - Building	11	7.37	0.27	0.04
ST 45-Secure Admin Facility - Building	8	0.60	0.02	<0.01
ST 46-INSCOM Phase 4 - Building	16	16.55	0.69	0.10
ST 47-Religious Education Center - Building	9	2.35	0.08	0.01
ST 48-INSCOM Warehouse - Building	8	1.20	0.04	0.01
ST 49-911th ECOC - Building	16	16.55	0.69	0.10
ST 50-Vehicle Maintenance Shop - Building	8	0.61	0.02	<0.01
ST 51-NECIS Facility - Building	12	9.02	0.34	0.05
ST 52-DLA HQ Building - Building	8	0.92	0.03	<0.01

Sources: USEPA 1995 and USEPA 2005b

Notes: PM₁₀/TSP = 0.45PM_{2.5}/PM₁₀ = 0.15

EF TSP = 80 lbs/acre/day

Table E-12. Worker Trip Emissions

Project	VMT	EF CO	CO [tons]	EF NO _x	NO _x [tons]	EF PM ₁₀	PM ₁₀ [tons]	EF PM _{2.5}	PM _{2.5}	EF SO ₂	SO ₂	EF VOC	VOC
ST 01-New PX - Clearing	18,274	4.05	0.08	0.32	0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.01
ST 01-New PX - Building	1,551,312	4.05	6.92	0.32	0.54	0.01	0.02	0.01	0.02	0.01	0.02	0.29	0.50
ST 01-New PX - Paving	5,664	4.05	0.03	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 02-PAL - Clearing	2,029	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 02-PAL - Building	488,016	4.05	2.18	0.32	0.17	0.01	0.01	0.01	0.01	0.01	0.01	0.29	0.16
ST 02-PAL - Paving	154	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 03-NICE - Clearing	947	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 03- NICE - Building	38,023	4.05	0.17	0.32	0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.01
ST 03- NICE - Paving	21	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 04-Mulligan Road Phase II - Clearing	27,652	4.05	0.12	0.32	0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.01
ST 04-Mulligan Road Phase II - Paving	7,514	4.05	0.03	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 05-Fisher House 1 - Clearing	541	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 05-Fisher House 1 - Building	18,468	4.05	0.08	0.32	0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.01
ST 05-Fisher House 1 - Paving	24	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 06-USO Family Center - Clearing	1,167	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 06-USO Family Center - Building	57,713	4.05	0.26	0.32	0.02	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.02
ST 06-USO Family Center - Paving	22	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 07-DAAF Firehouse Expansion - Clearing	129	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 07-DAAF Firehouse Expansion - Building	6,718	4.05	0.03	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 07-DAAF Firehouse Expansion - Paving	0	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 08-CDC 144 - Clearing	1,244	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 08-CDC 144 - Building	25,159	4.05	0.11	0.32	0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.01
ST 08-CDC 144 - Paving	39	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 09-Family Travel Camp Phase 1 - Clearing	4,346	4.05	0.02	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 09-Family Travel Camp Phase 1 - Building	2,637	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 09-Family Travel Camp Phase 1 - Paving	60	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 11-CDC 1 - Clearing	1,082	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 11-CDC 1 - Building	19,832	4.05	0.09	0.32	0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.01
ST 11-CDC 1 - Paving	174	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 12-CDC 2 - Clearing	150	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 12-CDC 2 - Building	19,832	4.05	0.09	0.32	0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.01
ST 12-CDC 2 - Paving	8	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 13- Lieber Gate - Clearing	3,306	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 13- Lieber Gate - Building	2,385	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 13- Lieber Gate - Paving	676	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 14- Stormwater Facility - Clearing	1,183	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 14- Stormwater Facility - Paving	9	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 15-AAFES Car Wash - Clearing	38	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01

Project	VMT	EF CO	CO [tons]	EF NO _x	NO _x [tons]	EF PM ₁₀	PM ₁₀ [tons]	EF PM _{2.5}	PM _{2.5}	EF SO ₂	SO ₂	EF VOC	VOC
ST 15-AAFES Car Wash - Building	2,124	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 15-AAFES Car Wash - Paving	4	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 16-PX - Demolition	3,595	4.05	0.02	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 17-Reconfigure Golf Course - Clearing	76,193	4.05	0.34	0.32	0.03	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.02
ST 17-Reconfigure Golf Course - Paving	1,465	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 18-NMUSA -- Clearing	37,240	4.05	0.17	0.32	0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.01
ST 18-NMUSA -- Paving	27,930	4.05	0.12	0.32	0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.01
ST 19-INSCOM Phase 1 - Clearing	2,060	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 19-INSCOM Phase 1 - Building	2,542,428	4.05	11.33	0.32	0.88	0.01	0.03	0.01	0.03	0.01	0.03	0.29	0.81
ST 19-INSCOM Phase 1 - Paving	40	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 20-South Post Fire Station - Clearing	437	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 20-South Post Fire Station - Building	19,193	4.05	0.09	0.32	0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.01
ST 20-South Post Fire Station - Paving	3	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 21-AAFES Car Care Center - Clearing	48	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 21-AAFES Car Care Center - Building	16,313	4.05	0.07	0.32	0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.01
ST 21-AAFES Car Care Center - Paving	0	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 22-Pet Care Center - Clearing	301	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 22-Pet Care Center - Building	8,803	4.05	0.04	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 22-Pet Care Center Station - Paving	8	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 23-NGA Canine Training/Facility - Clearing	147	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 23-NGA Canine Training/Facility - Building	1,888	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 23-NGA Canine Training/Facility - Paving	1	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 24-Fairfax County School - Clearing	2,579	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 24-Fairfax County School - Building	449,265	4.05	2.00	0.32	0.16	0.01	0.01	0.01	0.01	0.01	<0.01	0.29	0.14
ST 24-Fairfax County School - Paving	151	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 25-Casual Dining Restaurant - Clearing	60	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 25-Casual Dining Restaurant - Building	11,337	4.05	0.05	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 25-Casual Dining Restaurant - Paving	6	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 26-INSCOM Phase 2 - Clearing	2,060	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 26-INSCOM Phase 2 - Building	1,138,039	4.05	5.07	0.32	0.40	0.01	0.01	0.01	0.01	0.01	0.01	0.29	0.36
ST 26-INSCOM Phase 2 - Paving	40	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 27-NMUSA Phase 1 - Clearing	9,931	4.05	0.04	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 27-NMUSA Phase 1 - Building	1,147,833	4.05	5.12	0.32	0.40	0.01	0.01	0.01	0.01	0.01	0.01	0.29	0.37
ST 27-NMUSA Phase 1 - Paving	1,552	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 28-Main Post Commissary - Clearing	12,391	4.05	0.06	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 28-Main Post Commissary - Building	740,362	4.05	3.30	0.32	0.26	0.01	0.01	0.01	0.01	0.01	0.01	0.29	0.24
ST 28-Main Post Commissary - Paving	164	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 29-DLA Visitor Control Center - Clearing	139	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 29-DLA Visitor Control Center - Building	4,809	4.05	0.02	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 29-DLA Visitor Control Center - Paving	13	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 30-Fisher House 2 - Clearing	541	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01

Project	VMT	EF CO	CO [tons]	EF NO _x	NO _x [tons]	EF PM ₁₀	PM ₁₀ [tons]	EF PM _{2.5}	PM _{2.5}	EF SO ₂	SO ₂	EF VOC	VOC
ST 30-Fisher House 2 - Building	18,468	4.05	0.08	0.32	0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.01
ST 30-Fisher House 2 - Paving	19	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 31-Family Travel Camp Phase 2 - Clearing	377	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 31-Family Travel Camp Phase 2 - Paving	35	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 32-249th Infantry HQ - Clearing	5,128	4.05	0.02	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 32-249th Infantry HQ - Building	331,442	4.05	1.48	0.32	0.12	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.11
ST 32-249th Infantry HQ - Paving	462	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 33-INSCOM Phase 3 - Clearing	2,060	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 33-INSCOM Phase 3 - Building	1,174,360	4.05	5.23	0.32	0.41	0.01	0.02	0.01	0.01	0.01	0.01	0.29	0.38
ST 33-INSCOM Phase 3 - Paving	40	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 34-NMUSA Phase 2 - Clearing	9,931	4.05	0.04	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 34-NMUSA Phase 2 - Building	97,813	4.05	0.44	0.32	0.03	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.03
ST 34-NMUSA Phase 2 - Paving	1,552	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 35-Retail Fuel Point - Clearing	313	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 35-Retail Fuel Point - Building	1,220	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 35-Retail Fuel Point - Paving	29	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 36-29th Infantry HQ - Clearing	3,042	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 36-29th Infantry HQ - Building	85,307	4.05	0.38	0.32	0.03	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.03
ST 36-29th Infantry HQ - Paving	29	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 37-Medical Office Building - Clearing	180	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 37-Medical Office Building - Building	48,790	4.05	0.22	0.32	0.02	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.02
ST 37-Medical Office Building - Paving	17	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 38-NMUSA Phase 3 - Clearing	9,931	4.05	0.04	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 38-NMUSA Phase 3 - Building	97,813	4.05	0.44	0.32	0.03	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.03
ST 38-NMUSA Phase 3 - Paving	1,552	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 39-Multipurpose Fields - Clearing	795	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 39-Multipurpose Fields - Paving	406	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 40-DLA Parking Garage - Clearing	361	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 40-DLA Parking Garage - Building	4,261,320	4.05	19.00	0.32	1.48	0.01	0.05	0.01	0.05	0.01	0.04	0.29	1.36
ST 40-DLA Parking Garage - Paving	15	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 41-NMUSA Phase 4 - Clearing	9,931	4.05	0.04	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 41-NMUSA Phase 4 - Building	97,813	4.05	0.44	0.32	0.03	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.03
ST 41-NMUSA Phase 4 - Paving	1,552	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 42-UPH - Clearing	183	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 42-UPH - Building	492,427	4.05	2.20	0.32	0.17	0.01	0.01	0.01	0.01	0.01	0.01	0.29	0.16
ST 42-UPH - Paving	8	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 43-OSEG Training Compound - Clearing	4,058	4.05	0.02	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 43-OSEG Training Compound - Building	399,121	4.05	1.78	0.32	0.14	0.01	0.01	0.01	<0.01	0.01	<0.01	0.29	0.13
ST 43-OSEG Training Compound - Paving	236	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 44-Baseball Field Replacement - Clearing	277	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 45-Secure Admin Facility - Clearing	289	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01

Project	VMT	EF CO	CO [tons]	EF NO _x	NO _x [tons]	EF PM ₁₀	PM ₁₀ [tons]	EF PM _{2.5}	PM _{2.5}	EF SO ₂	SO ₂	EF VOC	VOC
ST 45-Secure Admin Facility - Building	518,739	4.05	2.31	0.32	0.18	0.01	0.01	0.01	0.01	0.01	0.01	0.29	0.17
ST 45-Secure Admin Facility - Paving	13	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 46-INSCOM Phase 4 - Clearing	2,060	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 46-INSCOM Phase 4 - Building	500,945	4.05	2.23	0.32	0.17	0.01	0.01	0.01	0.01	0.01	0.01	0.29	0.16
ST 46-INSCOM Phase 4 - Paving	40	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 47-Religious Education Center - Clearing	337	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 47-Religious Education Center - Building	38,055	4.05	0.17	0.32	0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.01
ST 47-Religious Education Center - Paving	24	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 48-INSCOM Warehouse - Clearing	2,827	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 48-INSCOM Warehouse - Building	188,500	4.05	0.84	0.32	0.07	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.06
ST 48-INSCOM Warehouse - Paving	21	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 49-911th ECOC - Clearing	2,827	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 49-911th ECOC - Building	110,282	4.05	0.49	0.32	0.04	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.04
ST 49-911th ECOC - Paving	25	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 50-Vehicle Maintenance Shop - Clearing	106	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 50-Vehicle Maintenance Shop - Building	59,454	4.05	0.27	0.32	0.02	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.02
ST 50-Vehicle Maintenance Shop - Paving	9	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 51-NECISF - Clearing	255	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 51- NECISF - Building	288,563	4.05	1.29	0.32	0.10	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	0.09
ST 51- NECISF - Paving	4	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 52-DLA HQ Building - Clearing	1,304	4.05	0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01
ST 52-DLA HQ Building - Building	1,620,824	4.05	7.22	0.32	0.56	0.01	0.02	0.01	0.02	0.01	0.02	0.29	0.52
ST 52-DLA HQ Building - Paving	68	4.05	<0.01	0.32	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.29	<0.01

Sources: USEPA 2012 and SQAQMD 1993

Table E-13. Estimated Construction Emissions - ST40 and ST52

		Estimated Annual Air Emissions (tpy)					
Project - ST 40-DLA Parking Garage		CO	NO_x	PM₁₀	PM_{2.5}	SO₂	VOC
Heavy Equipment Emissions	Clearing	0.06	0.13	0.01	0.01	0.02	0.01
Heavy Equipment Emissions	Building	16.68	40.52	3.13	3.03	5.55	3.82
Heavy Equipment Emissions	Paving	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Worker Trip Emissions	Clearing	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Worker Trip Emissions	Building	19	1.48	0.05	0.05	0.04	3.66
Worker Trip Emissions	Paving	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Architectural Coating Emissions	Building	-	-	-	-	-	1.46
Paving Off-gas Emissions	Paving	-	-	-	-	-	0.0005
Fugitive Dust Emissions	Clearing	-	-	0.04	0.01	-	-
	Total	35.7	42.1	3.2	3.1	5.6	8.9
Alternative 1 (Year 5)		40.5	50.7	5	3.9	6.9	10.3
Alternative 2 (Year 5)		4.8	8.6	1.8	0.8	1.3	1.3
		Estimated Annual Air Emissions (tpy)					
Project - ST 52-DLA HQ Building		CO	NO_x	PM₁₀	PM_{2.5}	SO₂	VOC
Heavy Equipment Emissions	Clearing	0.06	0.14	0.02	0.01	0.03	0.01
Heavy Equipment Emissions	Building	6.34	15.21	1.30	1.26	2.17	1.43
Heavy Equipment Emissions	Paving	0.0029	0.0063	0.0006	0.0006	0.0011	0.0005
Worker Trip Emissions	Clearing	0.01	<0.1	<0.1	<0.1	<0.1	<0.1
Worker Trip Emissions	Building	7.22	0.56	<0.1	<0.1	<0.1	<0.1
Worker Trip Emissions	Paving	-	-	-	-	-	0
Architectural Coating Emissions	Building	-	-	-	-	-	1.4
Paving Off-gas Emissions	Paving	-	-	-	-	-	0.0024
Fugitive Dust Emissions	Clearing	-	-	0.14	0.02	-	-
	Total	13.6	15.9	1.5	1.3	2.2	2.8
Alternative 1 (Year 6)		44.4	44.4	61.2	7.3	5.4	8.7
Alternative 2 (Year 6)		30.8	30.8	45.3	5.8	4.1	6.5

Table E-14. Estimated Construction Emissions - Alternative 2

Activity/Source				
	NO _x	PM _{2.5}	SO ₂	VOC
Construction Emissions (Year 1)	45.1	3.7	5.4	7.5
Construction Emissions (Year 2)	61.8	5.0	7.9	9.6
Construction Emissions (Year 3)	40.5	3.0	5.1	7.5
Construction Emissions (Year 4)	20.9	1.7	2.8	4.2
Construction Emissions (Year 5)	8.6	0.8	1.3	1.3
Construction Emissions (Year 6)	45.3	4.1	6.5	8.9
Average	37.0	3.0	4.8	6.5

Table E-15. Estimated Construction Emissions - Alternative 3

Activity/Source	Estimated Annual Air Emissions (tpy)			
	NO _x	PM _{2.5}	SO ₂	VOC
Estimated Construction Emissions Shifted to Long-Term Projects				
Construction Emissions (Year 1)	0.0	0.0	0.0	0.0
Construction Emissions (Year 2)	14.6	1.6	1.7	1.6
Construction Emissions (Year 3)	28.9	2.2	3.7	4.0
Construction Emissions (Year 4)	5.1	0.5	0.7	0.6
Construction Emissions (Year 5)	3.4	0.4	0.6	0.3
Construction Emissions (Year 6)	22.5	2.1	3.3	3.2
Short-Term Construction Emission (Alternative 1)				
Construction Emissions (Year 1)	45.1	3.7	5.4	7.5
Construction Emissions (Year 2)	61.8	5	7.9	9.6
Construction Emissions (Year 3)	40.5	3	5.1	7.5
Construction Emissions (Year 4)	20.9	1.7	2.8	4.2
Construction Emissions (Year 5)	50.7	3.9	6.9	10.3
Construction Emissions (Year 6)	61.2	5.4	8.7	11.8
Short-Term Construction Emission (Alternative 3)				
Construction Emissions (Year 1)	45.1	3.7	5.4	7.5
Construction Emissions (Year 2)	47.2	3.4	6.2	8.1
Construction Emissions (Year 3)	11.6	0.8	1.4	3.5
Construction Emissions (Year 4)	15.8	1.2	2.1	3.6
Construction Emissions (Year 5)	47.3	3.5	6.3	10.0
Construction Emissions (Year 6)	38.7	3.3	5.4	8.6
Average	34.3	2.7	4.5	6.9

Table E-16 Heating Emissions

General Information								
Heating Fuel	Natural Gas							
Region	South							
Heating Requirements	101.2	Btu/sf						
Heating Value	1,020	Btu/scf						
Annual Fuel Use	0.0992	scf/yr/sqft						
Pollutant		CO	NO _x	VOC	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Emission Factors (lb/1,000 scf)		8.4E+01	1.9E+02	5.5E+00	6.0E-01	7.6E+00	7.6E+00	1.2E+05
Emission Factors (tpy/1,000 sf)		4.2E-03	9.4E-03	2.7E-04	3.0E-05	3.8E-04	3.8E-04	6.0E+00
Alternative 1	Heated Area (Sqft)	Annual Emissions [tpy]						
Short-Term	2,771,982	11.6	26.1	0.8	0.1	1.0	1.0	16,501
Long-Term	2,406,000	10.0	22.7	0.7	0.1	0.9	0.9	14,323
Total	5,177,982	21.6	48.8	1.4	0.2	2.0	2.0	30,824
Alternative 2								
Short-Term	2,504,982	10.4	23.6	0.7	0.1	0.9	0.9	14,912
Long-Term	1,173,000	4.9	11.1	0.3	0.0	0.4	0.4	6,983
Total	3,677,982	15.3	34.7	1.0	0.1	1.4	1.4	21,895
Alternative 3								
Short-Term	1,327,459	5.5	12.5	0.4	0.0	0.5	0.5	7,902
Long-Term	3,850,523	16.0	36.3	1.1	0.1	1.5	1.5	22,922
Total	5,177,982	21.6	48.8	1.4	0.2	2.0	2.0	30,824

Sources: USEPA 1995 and DOE 2003

Table E-17 Worker Commutes

General Information								
Miles per Trip	14							
Number of Days	260							
Number of Trips	2							
Commuting Factor	0.6							
Miles/Employee	4368							
	Year	CO	NO _x	VOC	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
	2017	3.3E-03	2.8E-04	5.9E-05	1.0E-05	1.1E-05	1.0E-05	1.0E-03
	2030	3.0E-03	1.5E-04	4.0E-05	8.7E-06	1.0E-05	9.4E-06	9.2E-04
Alternative 1	Additional Personnel	Annual Emissions [tpy]						
Short-Term	4,755	34.5	2.9	0.6	0.1	0.1	0.1	10.6
Long-Term	12,030	80.1	3.8	1.1	0.2	0.3	0.2	24.1
Total	16,785	114.6	6.7	1.7	0.3	0.4	0.4	34.7
Alternative 2								
Short-Term	3,755	27.3	2.3	0.5	0.1	0.1	0.1	8.4
Long-Term	5,530	36.8	1.8	0.5	0.1	0.1	0.1	11.1
Total	9,285	64.1	4.0	1.0	0.2	0.2	0.2	19.5
Alternative 3								
Short-Term	1,589	11.5	1.0	0.2	0.0	0.0	0.0	3.5
Long-Term	15,196	101.2	4.9	1.3	0.3	0.3	0.3	30.5
Total	16,785	112.7	5.8	1.5	0.3	0.4	0.3	34.0

Source: USEPA 2012

Table E-18 Emissions from Generators Exempt from Permitting

Unit Information								
Rated Capacity	1,100	bkW						
Horsepower	1,475	hp						
Hours of Operation	100	hr/yr						
			NO _x	CO	VOC	PM	SO _x	CO ₂
Emission Factor	(g/hp-hr)		8.92	1.30	0.16	0.133	<0.1	1.150
			Emissions (tpy)					
			NO _x	CO	VOC	PM	SO _x	CO ₂
	Number of Units	1	1.45	0.21	0.03	0.02	<0.1	85
Alternative 1 and 2								
Short-Term	Number of Units	12	17.4	2.5	0.3	0.3	<0.1	1,018
Alternative 3								
Short-Term	Number of Units	8	11.6	1.7	0.2	0.2	<0.1	679
Long-Term	Number of Units	4	5.8	0.8	0.1	0.1	<0.1	339

1. Sources: USEPA 1995, and Caterpillar 2011.

2. Assume PM = PM₁₀ = PM_{2.5}.

3. Generator operates on ultra low sulfur diesel with a sulfur content of 15 ppm (0.0015% sulfur content).

4. Assumes back-up generators exempt from permitting for ST03, ST07, ST13, ST18, ST20, ST23, ST29, ST32, ST43, ST45, ST49, and ST51.

Table E-19 Total Operational Emissions (tpy)

	Annual Emissions (tpy)						
	CO	NO _x	VOC	SO ₂	PM ₁₀	PM _{2.5}	CO ₂
Alternative 1							
Short-Term Projects	48.6	46.4	1.7	0.2	1.4	1.4	17,530
Long-Term Projects	90.1	26.5	1.7	0.3	1.2	1.2	14,347
Total	138.7	72.9	3.4	0.5	2.6	2.6	31,877
Alternative 2							
Short-Term Projects	40.2	43.3	1.5	0.2	1.3	1.3	15,938
Long-Term Projects	41.7	12.8	0.8	0.1	0.6	0.6	6,994
Total	81.9	56.1	2.3	0.3	1.9	1.8	22,932
Alternative 3							
Short-Term Projects	18.8	25.1	0.8	0.1	0.7	0.7	8,584
Long-Term Projects	118.0	46.9	2.5	0.4	1.9	1.9	23,292
Total	136.8	72.0	3.3	0.5	2.6	2.6	31,876

Sources: USEPA 1995, EIA 2007, USEPA 2012

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E.3 RECORD OF NON-APPLICABILITY (RONA)

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RECORD OF NON-APPLICABILITY

In Accordance with the Clean Air Act- General Conformity Rule For
The Proposed Real Property Master Plan, Fort Belvoir, Virginia.

July 20, 2015


The Army's proposed action is to adopt and implement an updated Real Property Master Plan (RPMP) for Fort Belvoir's Main Post and the Fort Belvoir North Area (FBNA) and to implement the plan's proposed short-term development. Following full implementation of the 2005 Defense Base Closure and Realignment Commission (BRAC) recommendations for Fort Belvoir, the September 2011 Main Post and FBNA workforce was 39,000. Future growth projections for Main Post and the FBNA indicate an increase of about 17,000 personnel by 2030. If fully accommodated, the September 2011 workforce would expand to approximately 56,000 by 2030. The proposed Real Property Master Plan includes short-term construction, demolition, and roadway improvement projects and long-term construction and developments projects to support the Army's mission of establishing optimal land use and optimal allocation of resources. A detailed description of the proposed action and a list of the proposed short- and long-term projects is in Section 2 of the EIS.

Construction activities including the use of construction equipment, worker vehicles (e.g., bulldozers, paving equipment), use of VOC paints, and fugitive particles from surface disturbances were included in the analysis. General Conformity under the Clean Air Act, Section 176 has been evaluated according to the requirements of 40 CFR 93.153, Subpart B. Regardless of the alternative ultimately implemented, the requirements of this rule are not applicable because:

The highest total annual direct and indirect emissions from this action have been estimated at 61.2 tons NO_x, 11.8 tons VOCs, 5.4 tons PM_{2.5}, and 8.7 tons SO₂ per year, which would be below the conformity threshold values of 50 tons VOCs and 100 tons for SO₂, PM_{2.5}, and NO_x.

Supported documentation and emission estimates:

- (X) Are Attached
- (X) Appear in the NEPA Documentation
- () Other (Not Necessary)

for 

Michelle D. Mitchell
Colonel, U.S. Army
Garrison Commander

7/20/2015
Date

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APPENDIX F
NATURAL RESOURCES COORDINATION

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TABLE OF CONTENTS

Section	Page
Correspondence	F-1
Small Area Maps.....	F-75
Water Resources Small Area Maps	F-77
Ecological Resources Small Area Maps.....	F-95

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CORRESPONDENCE

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Carter's Run Environmental Corporation

July 16, 2013

Mr. John Bullard
Regional Administrator
National Marine Fisheries Service
Northeast Region
55 Great Republic Drive
Gloucester, MA 01930-2276

Re: Fort Belvoir Real Property Master Plan Environmental Impact Statement
Preliminary Coordination

Dear Mr. Bullard

The United States (U.S.) Army Garrison Fort Belvoir is in the process of developing a new Real Property Master Plan (RPMP) for Fort Belvoir's Main Post and the Fort Belvoir North Area (FBNA). They are also preparing an EIS to address adoption of the RPMP and implementation of the plan's proposed short-term (2012 – 2017) development projects. These include 52 site development and seven transportation improvement projects. The EIS will also, to the extent that we have information, address ten long-term (2018 – 2030) development and ten long-term transportation improvement projects.

Fort Belvoir last prepared a master plan in 1993 and amended it in 2002 and 2007. In light of the substantial changes that have occurred on post since 1993, the amended 1993 master plan no longer serves to adequately guide the management and use of real property assets – land, facilities, resources, and infrastructure – on the installation.

Most projects addressed by the new RPMP would be located in the central, upland portion of the Main Post, and many would be located on previously-developed and previously disturbed areas. The short-term projects include 52 site development projects covering a wide range of uses (professional/medical/institutional buildings, elementary schools, parking garages, the new Post Exchange and Commissary, and facilities for other support services). There are also seven short-term transportation projects including intersection improvements, transit hubs, new access control points, and roadway improvements. Some projects, such as the Fort Belvoir Travel Camp, the National Museum of the Army, and the Richmond Highway-Telegraph Road Connector (Mulligan Road) have already been evaluated through the NEPA process, but will be included in this EIS as well to provide the full picture of the RPMP's impacts.

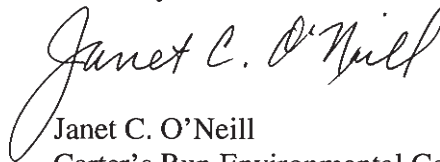
Carter's Run Environmental Corporation

The RPMP also addresses ten long-term development "projects" and ten long-term transportation projects. The long-term development projects are really potential suitable sites for development or redevelopment in the future. The long-term transportation projects are largely road and intersection improvements. While the RPMP EIS will be the only NEPA document prepared for the short-term projects, additional NEPA documentation will be prepared for the long-term projects as more specific design information becomes available.

None of the short or long-term projects involve direct impacts to Accotink Creek, Pohick Creek, Dogue Creek, Accotink Bay, Pohick Bay, Gunston Cove, or the Potomac River. The thrust of the RPMP is to reserve large tracts of buildable areas for future campuses and/or phased infill type development. These buildable areas have been configured to the extent feasible to avoid ecologically sensitive areas.

We would like your help in describing: what listed, proposed, and candidate species may be in the action area; what critical or proposed critical habitats may be in the area; and any points-of-contact you think would be helpful. If you need further information, please contact me at 540-219-032. Thank you for your assistance.

Sincerely



Janet C. O'Neill
Carter's Run Environmental Corporation

Copies to:

Mr. Marc Russell
Environmental Program Manager-NEPA
DPW-Environmental Division (ENRD)
9430 Jackson Loop, Bldg 1442, Suite 200
Fort Belvoir, VA 22060-5116

Ms. Penny Douglas
AECOM
975 North Washington Street, Suite 300
Alexandria, VA 22314-1939

Carver, Craig

From: Janet O'Neill <janet1118@verizon.net>
Sent: Tuesday, July 23, 2013 12:39 PM
To: christine.vaccaro@noaa.gov
Cc: Douglas, Penny
Subject: Fort Belvoir Real Property Master Plan EIS

Carter's Run Environmental Corporation

Dear Ms. Vaccaro,

Thank you for your telephone call this morning. This email is to confirm that the National Marine Fisheries Service has no concern with adoption of the proposed Fort Belvoir Real Property Master Plan as described in my July 16, 2013 letter, because the plan would not result in any work within the Potomac River or its embayments. If the plan changes, and work within tidal waters is proposed, we will re-coordinate and afford NMFS an opportunity to review and comment.

Thank you, and have a great day.

Janet O'Neill
Carter's Run Environmental Corporation

Carver, Craig

From: Christine Vaccaro - NOAA Federal <christine.vaccaro@noaa.gov>
Sent: Tuesday, July 23, 2013 12:56 PM
To: JanetO'Neill
Cc: Douglas, Penny
Subject: Re: Fort Belvoir Real Property Master Plan EIS

Dear Ms. O'Neill,

That is correct. Because your project will not create any impacts that could possibly effect listed species (i.e., in the Potomac River or other large tidal river), you do not need to coordinate any further with us and we have no concerns with your project.

Cheers,

Chris Vaccaro
Fisheries Biologist
Protected Resources Division
NOAA Fisheries/NERO
Gloucester, MA
Phone: 978-281-9167
Email: christine.vaccaro@noaa.gov

On Tue, Jul 23, 2013 at 12:38 PM, JanetO'Neill <janet1118@verizon.net> wrote:

Carter's Run Environmental Corporation

Dear Ms. Vaccaro,

Thank you for your telephone call this morning. This email is to confirm that the National Marine Fisheries Service has no concern with adoption of the proposed Fort Belvoir Real Property Master Plan as described in my July 16, 2013 letter, because the plan would not result in any work within the Potomac River or its embayments. If the plan changes, and work within tidal waters is proposed, we will re-coordinate and afford NMFS an opportunity to review and comment.

Thank you, and have a great day.

Janet O'Neill
Carter's Run Environmental Corporation

Janet O'Neill

From: JanetO'Neill <janet1118@verizon.net>
Sent: Monday, July 22, 2013 1:48 PM
To: Janet O'Neill
Subject: Fwd: no subject
Attachments: NHServicePDF- Fort Belvoir RPMP EIS.pdf; Fort_Belvoir_USGS_Project_Map.pdf

Jul 22, 2013 12:46:52 PM, janet1118@verizon.net wrote:

Carter's Run Environmental Corporation

Dear Renee:

The Army is in the process of developing a new Real Property Master Plan (RPMP) for Fort Belvoir's Main Post and the Fort Belvoir North Area (FBNA). They are also preparing an EIS to address adoption of the RPMP, and implementation of the plan's proposed short-term (2012 – 2017) development projects. The EIS will also, to the extent that we have information, address ten long-range development and ten long-range transportation improvement projects.

Attached is a USGS map showing the location of Fort Belvoir (Main Post and the North Area), and a Project Review Request form. Please contact me (540-219-0322) if you need more information.

Thank-you!

Janet C. O'Neill

Carter's Run Environmental Corporation, 7137 Wilson Road, Marshall, VA 20115



INFORMATION SERVICES ORDER FORM Updated 11/10



Mail or Email to: Project Review Coordinator

DCR Division of Natural Heritage

217 Governor Street

Richmond, VA 23219

Voice: (804) 371-2708 Fax: (804) 371-2674

nhreview@dcr.virginia.gov

ENVIRONMENTAL REVIEW SERVICES:

- ☒ **Project Review** (30 calendar day turnaround)..**\$90 per site**; add **\$35 for 1-5** natural heritage occurrences (rare plants, rare animals, significant communities and karst) and **\$60 for 6** or more occurrences.
Multi-quad project area **\$90 per quad**.
- ☐ **Project Review with Accompanying Map...\$250 per site**; for projects with potential impact to Natural Heritage Resources including alternative energy projects, written comments with 8.5 X 11 map displaying Natural Heritage Screening Coverage.
- ☐ **Priority Service** (5 business day turnaround)..**\$500 surcharge**

Details: Describe project in the space below, please include detailed project description, project location information including **latitude, longitude**, acreage, and existing site conditions (photographs if available). Attach additional information as necessary. In order to ensure an accurate assesement, please submit **an electronic copy of a site map** (preferably from a USGS topo map with identified project boundaries) and all other information to **nhreview@dcr.virginia.gov** or fax a map to: **Environmental Review Coordinator @(804) 371-2674**. Please include the project title on all correspondence. **Incomplete submittal of information will delay the review process.**

Project Title: Fort Belvoir Real Property Master Plan EIS CREC Project #11120

Project Description:

Fort Belvoir is preparing a Real Property Master Plan (RPMP) for Fort Belvoir's Main Post and the Fort Belvoir North Area (FBNA), and an EIS to address adoption of the RPMP and implementation of the plan's proposed short-term (2012 – 2017) development projects. Most projects would be located in the central, upland portion of the Main Post, and many would be located on previously-developed and previously disturbed areas. The short-term projects include 52 site development projects (professional/medical/institutional buildings, elementary schools, parking garages, and facilities for other support services), and seven transportation projects including intersection improvements, transit hubs, new access control

points, and roadway improvements. The RPMP will address in a general manner ten long-term potentially suitable sites for development or redevelopment, and ten road and intersection improvements projects.

Page 2



INFORMATION SERVICES ORDER FORM Updated 11/10



Natural Heritage Resource Reports & Distribution Maps

☐ Custom NHR Maps (describe, call for more information).....\$80/hour

☐ Custom NHR Reports (describe, call for more information).....\$60/hour

SUBSCRIPTION SERVICES: [Hyperlink to an example of the license agreement](#)

Natural Heritage Data Explorer Subscription Service

☐ (unlimited access per subscription year, complete a digital license agreement is required).....\$1000/yr.

Digital Conservation Sites Subscription Service (specify area of interest; complete a digital license agreement is required)

☐ 1 county or 12 quads or less.....\$1000/yr.

☐ 13-100 quads.....\$3500/yr.

☐ Statewide coverage.....\$6000/yr.

Please provide details in the space below: **(failure to provide information will delay subscription processing)**

Conditions:

1. Digitized DCR natural heritage resource locational data for GIS or map production, whether provided by DCR digitally or entered by the client from tables or reports, may not be used without first completing a data licensing agreement with DCR Division of Natural Heritage. A license form is available on request.

2. Although DCR-DNH data are closely quality controlled, DCR-DNH makes no warranty as to the fitness of the data for any purpose.

3. Any publication of data provided by DCR, whether as text, table or map, must acknowledge Virginia DCR-Natural Heritage Program, and include the date the data were provided by DCR

4. If fees are assessed, an invoice will be included with the response. **Please do not pre-pay.** Payment is due within 30 days of receipt. **Minimum charge for hourly fees is \$40.**

I understand and agree to the above conditions: ☒ Yes (Required for Fee Services)

Page 3



INFORMATION SERVICES ORDER FORM Updated 11/10



INFORMATION SERVICES ORDER FORM

DCR maintains lists of natural heritage resources monitored by the Natural Heritage Program. These lists provide information on taxonomy, rarity and federal/state legal statuses. These reports are not site specific and are **NOT** to be substituted for a project review or for on-site surveys required for environmental assessments of specific project areas.

Due to staff and budget constraints we ask that you use the online service whenever possible to download these lists of natural heritage resources:

Hyperlink to on-line reports (these may change as they are updated by inventory staff)

[The Natural Communities of Virginia, 2nd Approximation](#)

☐ **Natural Heritage Resources of Virginia: Rare Animals (PDF)**

☐ **Natural Heritage Resources of Virginia: Rare Plants (PDF)**

[County lists of natural heritage resources can be generated using the Internet Database Search Tool:](#)

Or requested below :

Send data and invoice (if applicable) to: (Please be sure to include a phone number and e-mail so we may contact you if we have any questions regarding your data needs)

Name: Janet C. O'Neill

Company: Carter's Run Environmental Corporation

Address: 7137 Wilson Road

City: Marshall

State/Zip: VA 20115

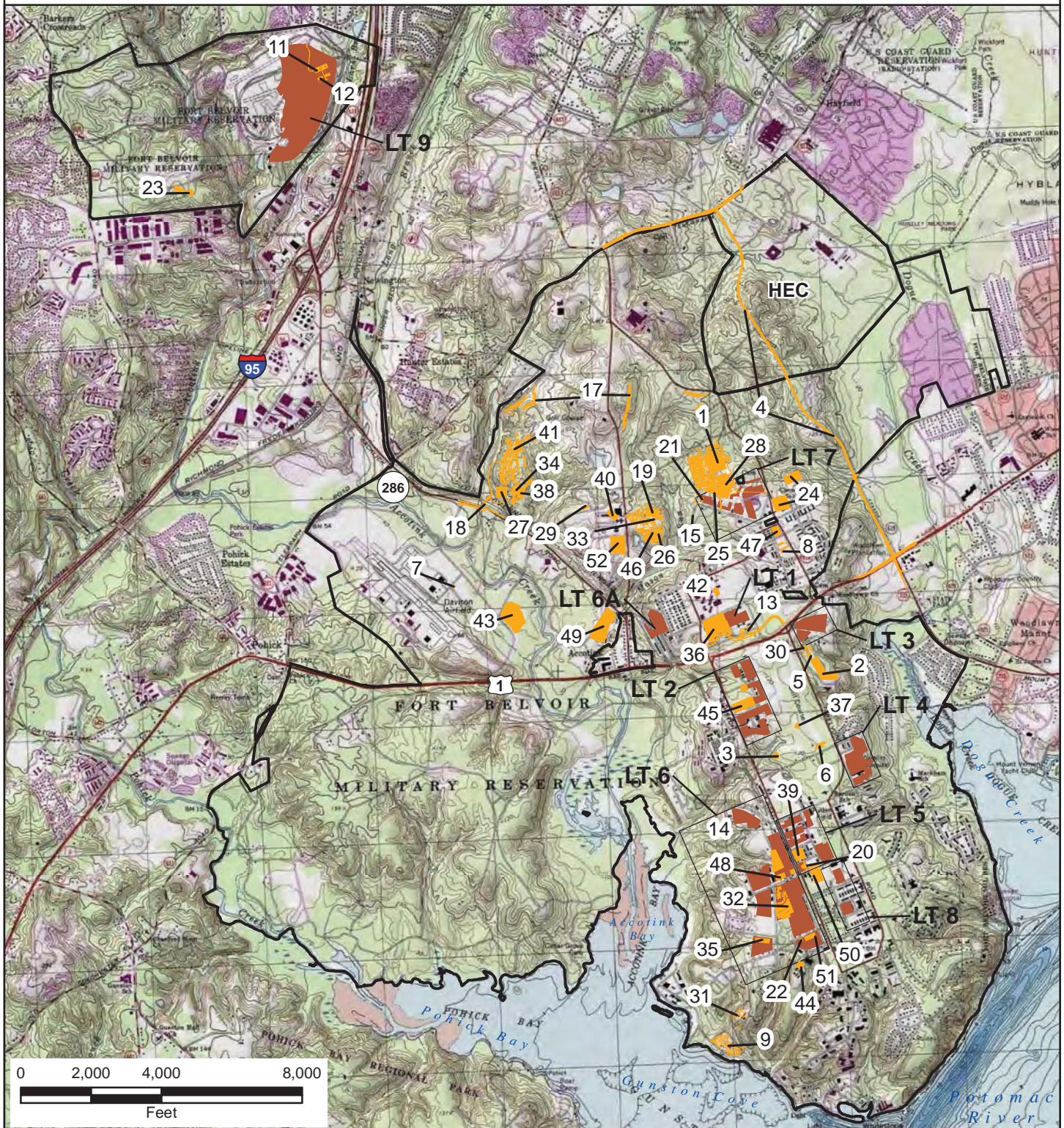
Phone: 540-219-0322

Fax:

Email: janet1118@verizon.net

Taxpayer ID #: 27-0783960

Fort Belvoir - Proposed Projects



Legend

- Short-Term Project Sites
(Construction FY 2012 - 2017)
- Long-Term Project Sites
(Construction FY 2018 - 2030)



Fort Belvoir RPMP EIS





COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

600 East Main Street, 24th Floor
Richmond, Virginia 23219
(804) 786-6124

August 16, 2013

Janet C. O'Neill
Carter's Run Environmental Corporation
7137 Wilson Road
Marshall, VA 20115

Re: 11120, Fort Belvoir Real Property Master Plan-Main Post and North Area

Dear Ms. O'Neill:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

Sites # 2, 3, , 5, 6, 9, 13, 20, 24, 30, 37, 39, 50 & LT 3, 4, 5, 8

Biotics documents the presence of natural heritage resources in the project area. However, due to the scope of the activity and the distance to the resources, we do not anticipate that this project will adversely impact these natural heritage resources.

Sites #1, 7, 8, 11, 12, 15, 17, 18, 19, 21, 25 - 29, 33, 34, 36, 38, 40 - 43, 45 - 47, 49, 52 & LT 1, 2, 6A, 7

According to the information currently in our files, the Accotink Wetlands Conservation Site is located downstream from the project sites. Conservation sites are tools for representing key areas of the landscape that warrant further review for possible conservation action because of the natural heritage resources and habitat they support. Conservation sites are polygons built around one or more rare plant, animal, or natural community designed to include the element and, where possible, its associated habitat, and buffer or other adjacent land thought necessary for the element's conservation. Conservation sites are given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain; on a scale of 1-5, 1 being most significant. Accotink Wetlands Conservation Site has been given a biodiversity significance ranking of B3, which represents a site of high significance. The natural heritage resources of concern at this site are:

<i>Bolboschoenus fluviatilis</i>	Tidal Freshwater Marsh (Mixed High Marsh Type)	G3/S4?/NL/NL
<i>Lathyrus palustris</i>	River bulrush	G5/S2/NL/NL
	Marsh pea	G3/S1/NL/NL

*State Parks • Nonpoint Pollution Prevention • Outdoor Recreation Planning
Natural Heritage • Dam Safety and Floodplain Management • Land Conservation*

Ranunculus ambigens
Glyptemys insculpta

Water-plantain crowfoot
Wood turtle

G4/S1/NL/NL
G3/S2/NL/LT

Site #4

According to the information currently in our files, the Dogue Creek Wetlands Conservation Site is located downstream from the project sites. Dogue Creek Wetlands Conservation Site has been given a biodiversity significance ranking of B5, which represents a site of general significance. The natural heritage resource of concern at this site is:

Glyptemys insculpta

Wood turtle

G3/S2/NL/LT

The Wood turtle (*Glyptemys insculpta*, G3/S2/NL/LT) ranges from southeastern Canada, south to the Great Lake states and New England. In Virginia, it is known from northern counties within the Potomac River drainage (NatureServe, 2009). The Wood turtle inhabits areas with clear streams with adjacent forested floodplains and nearby fields, wet meadows, and farmlands (Buhlmann et al., 2008; Mitchell, 1994). Since this species overwinters on the bottoms of creeks and streams, a primary habitat requirement is the presence of water (Mitchell, 1994).

Threats to the wood turtle include habitat fragmentation, urbanization, and automobile or farm machinery mortality (Buhlmann et al., 2008). Please note that the Wood turtle is currently classified as threatened by the Virginia Department of Game and Inland Fisheries (VDGIF).

In addition, Dogue Creek has been designated by the VDGIF as a "Threatened and Endangered Species Water" for this species.

Sites # 22, 31, 32, 44, 51

According to the information currently in our files, this site is located within the –Area T-17 Ravines Conservation Site that has been given a biodiversity significance ranking of B1, which represents a site of outstanding significance. The natural heritage resource of concern at this site is:

Northern Virginia Well Amphipod

Sygobromus phreaticus

G1/S1/SOC/NL

The Northern Virginia Well amphipod, is a distinctive species of subterranean amphipod that has a very limited range (Holsinger, 1991). Amphipods are tiny crustaceans more commonly known as freshwater shrimp, scuds, or sideswimmers. Their common names arise from their resemblance to shrimp and their habit of swimming or "scudding" along the substrate on their sides in an undulating motion (Pennak, 1978). Amphipods are common in freshwater ecosystems of Virginia; they also occur in brackish and marine waters along the coast. Unable to swim in open water, amphipods are confined to the substrate--the stones, wet leaves and aquatic vegetation of their freshwater habitats--where they feed on detritus (dead animal and plant matter).

The Northern Virginia Well amphipod has been documented at only three sites, including historical collections obtained from wells in Alexandria (1921) and Vienna (1948) in northern Virginia (suburbs of Washington, D.C.). The exact locations of both collection sites are unknown, but they are presumed to have been destroyed by subsequent urbanization (Holsinger, 1991). The only recent collections (1996 and 2003) are from a single ravine seepage habitat on a military base in Fairfax County, Virginia (Chazal and Hobson, 2003).

Threats to the Northern Virginia Well amphipod are pollution of the groundwater, disturbance of the groundwater recharge area (such as urbanization) and disturbance of aquatic habitats. Please note that this species is tracked as a species of concern by the United States Fish and Wildlife Service (USFWS); however, this designation does not have any official legal status.

Sites #11, 12, 23

According to the information currently in our files, the Fort Belvoir Proving Ground Conservation Site is located within the project sites. Fort Belvoir Proving Ground Conservation Site has been given a biodiversity significance ranking of B3, which represents a site of high significance. The natural heritage resource of concern at this site is:

Isotria medeoloides

Small whorled pogonia

G2/S2/LT/LE

Small whorled pogonia, a perennial orchid, grows in a variety of woodland habitats in Virginia, but tends to favor mid-aged woodland habitats on gently north or northeast facing slopes often within small draws. It is quite natural for plants of this species to remain dormant in the soil for long periods of time. Direct destruction, as well as habitat loss and alteration, are principle reasons for the species' decline (Ware, 1991). The Virginia Field Office of the U.S. Fish and Wildlife Service recommends that field surveys for this species be conducted in areas of Virginia south of Caroline County from May 25 through July 15 and in areas of Virginia from Caroline County and north from June 1 through July 20 (K. Mayne, pers. com. 1999). Please note that this species is currently classified as threatened by the United States Fish and Wildlife Service (USFWS) and as endangered by the Virginia Department of Agriculture and Consumer Services (VDACS).

Due to the potential for these sites to support populations of small whorled pogonia, DCR recommends an inventory for the resource in the study area prior to any forest clearing. With the survey results we can more accurately evaluate potential impacts to natural heritage resources and offer specific protection recommendations for minimizing impacts to the documented resources.

DCR-Division of Natural Heritage biologists are qualified and available to conduct inventories for rare, threatened, and endangered species. Please contact J. Christopher Ludwig, Natural Heritage Inventory Manager, at chris.ludwig@dcr.virginia.gov or 804-371-6206 to discuss arrangements for field work. A list of other individuals who are qualified to conduct inventories may be obtained from the USFWS.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. Survey results should be coordinated with DCR-DNH and USFWS. Upon review of the results, if it is determined the species is present, and there is a likelihood of a negative impact on the species, DCR-DNH will recommend coordination with VDACS to ensure compliance with Virginia's Endangered Plant and Insect Species Act.

To minimize adverse impacts to the aquatic ecosystem as a result of the proposed activities, DCR recommends the implementation of and strict adherence to applicable state and local erosion and sediment control/storm water management laws and regulations. In the areas within or adjacent to the Area T-17 Ravines, avoid disturbing any seeps or springs. Due to the legal status of Wood turtle, DCR also recommends coordination with Virginia's regulatory authority for the management and protection of this species, the VDGIF, to ensure compliance with the Virginia Endangered Species Act (VA ST §§ 29.1-563 – 570).

In addition, DCR also recommends a re-review when site specific plans become available, prior to any land disturbing activity.

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

New and updated information is continually added to Biotics. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

A fee of \$240.00 has been assessed for the service of providing this information. Please find enclosed an invoice for that amount. Please return one copy of the invoice along with your remittance made payable to the Treasurer of Virginia, **DCR - Division of Natural Heritage, 600 East Main Street, 24th Floor, Richmond, VA 23219**. Payment is due within thirty days of the invoice date. Please note the change of address for remittance of payment as of July 1, 2013. Late payment may result in the suspension of project review service for future projects.

The Virginia Department of Game and Inland Fisheries (VDGIF) maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from <http://vafwis.org/fwis/> or contact Gladys Cason (804-367-0909 or Gladys.Cason@dgif.virginia.gov). **For Sites 2, 4, 5, 13, 24, 30** Dogue Creek and Unnamed Tributary to Dogue Creek, which have been designated by the Virginia Department of Game and Inland Fisheries (VDGIF) as a "Threatened and Endangered Species Water", are downstream of the project sites. The species associated with these T & E Waters is the Wood turtle.

Should you have any questions or concerns, feel free to contact me at (804) 692-0984. Thank you for the opportunity to comment on this project.

Sincerely,



Alli Baird, LA, ASLA
Coastal Zone Locality Liaison

Cc: Amy Ewing, VDGIF
Troy Andersen, USFWS

Literature Cited

Buhlmann, K, T. Tuberville, and W. Gibbons. 2008. Turtles of the southeast. University of Georgia Press. Athens, GA. 252 pp.

Literature Cited

Chazal, A.C. and C. S. Hobson. 2003. Surveys for the Northern Virginia Well Amphipod (*Stygobromus phreaticus*) at Fort Belvoir, Virginia. Natural Heritage Technical Report 03-11. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. Unpublished report submitted to USAG Fort Belvoir. 11 pp plus appendix.

Holsinger, John R. 1991. *Stygobromus phreaticus*. In Virginia's Endangered Species: Proceedings of a Symposium. K. Terwilliger ed. The McDonald and Woodward Publishing Company, Blacksburg, Virginia. p185.

Mitchell, J. C. 1994. Reptiles of Virginia. Smithsonian Institution Press, Washington. pp. 88-91.

NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 8, 2010).

Pennak, R.W. 1978. Freshwater invertebrates of the southeastern United States, 2nd edition. John Wiley and sons, New York, NY. pp. 451-463.

Ware, D.M.E. 1991. Small whorled pogonia. In Virginia's Endangered Species: Proceedings of a Symposium. K. Terwilliger ed. The McDonald and Woodward Publishing Company, Blacksburg, Virginia.

Accounts Payable

COMMONWEALTH OF VIRGINIA

Department of Conservation and Recreation
Division of Natural Heritage
600 East Main Street, 24th Floor
Richmond, VA 23219

Make checks payable to the
TREASURER OF VIRGINIA

NOTICE new address to left

PLEASE include "Division of Natural Heritage" in the address when mailing payment.

Fed I.D. # 54-6004497
DUNS # 8097 44444

Payment is due 30 days after receipt
or invoice

INVOICE

Janet C. O'Neill
Carter's Run Environmental Corporation
7137 Wilson Road
Marshall, VA 20115

Invoice Number: **H- 10389**

Invoice Date: **August 16, 2013**

Taxpayer I.D.# 27-0783960

Please return remittance copy with payment
to ensure proper credit to your invoice.

Contact: **Rene' Hypes**

(804) 371-2671 Division of Natural Heritage
FAX# (804) 371-2674 TDD (804) 786-2121

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL AMOUNT
<i>Impact Review by Quad</i>	2	EA	90.00	180.00
Element Occurrences	6+	AT	60.00	60.00
<i>Site Reference</i>				
11120, Fort Belvoir Real Property				
Master Plan				

Credit Information:

199 0200 14 50317 02199 73201 304

Amount Due: \$240.00

The Department of Conservation and Recreation may charge interest on all past due accounts receivable in accordance with guidelines promulgated by the Department of accounts and at the underpayment rate prescribed in Section 58.1-15 of the Code of Virginia. Each past due account receivable may also be charge an additional mount which shall approximate the administrative cost incurred in collecting the past due amount. The Department may also assess late payment penalty fees as appropriate.

From: Janet O'Neill
Carter's Run Environmental Corporation
7137 Wilson Road, Marshall, VA 20115-2020
Email: janet1118@verizon.net
Telephone: 540-219-0322

To: U.S. Fish and Wildlife Service
Virginia Field Office
6669 Short Lane
Gloucester, Virginia 23061

October 21, 2013

Re: Online Project Review Request, Fort Belvoir Real Property Master Plan (RPMP), Fairfax County, Virginia

We have reviewed the referenced project using the Virginia Field Office's online project review process and have followed all guidance and instructions in completing the review. We completed our review on October 18, 2013, and are submitting our project review package in accordance with the instructions for further review.

The United States (U.S.) Army Garrison Fort Belvoir is in the process of developing a new RPMP for Fort Belvoir's Main Post and the Fort Belvoir North Area. They are also preparing an EIS to address adoption of the RPMP and implementation of the plan's proposed short-term (2012 – 2017) development projects. These include 52 site development and seven transportation improvement projects. The EIS will also, to the extent that we have information, address ten long-term (2018 – 2030) development and ten long-term transportation improvement projects.

Most projects addressed by the new RPMP would be located in the central, upland portion of the Main Post, and many would be located on previously-developed and previously disturbed areas. The 52 short-term projects include site developments covering a wide range of uses (professional/medical/institutional buildings, elementary schools, parking garages, the new Post Exchange and Commissary, and facilities for other support services). The seven short-term transportation projects including intersection improvements, transit hubs, new access control points, and roadway improvements. Some projects, such as the Fort Belvoir Travel Camp, the National Museum of the Army, and the Richmond Highway-Telegraph Road Connector (Mulligan Road) have already been evaluated through the NEPA process, but will be included in this EIS as well to provide the full picture of the RPMP's impacts.

The ten long-term development “projects” are really potential suitable sites for development or redevelopment in the future. The ten long-term transportation projects are largely road and intersection improvements. While the RPMP EIS will be the only NEPA document prepared for the short-term projects, additional NEPA documentation will be prepared for the long-term projects as more specific design information becomes available.

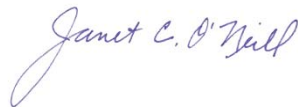
None of the short or long-term projects involve direct impacts to Accotink Creek, Pohick Creek, Dogue Creek, Accotink Bay, Pohick Bay, Gunston Cove, or the Potomac River. The thrust of the RPMP is to reserve large tracts of buildable areas for future campuses and/or phased infill type development. These buildable areas have been configured to the extent feasible to avoid ecologically sensitive areas.

The location of the project and the action area are identified on the enclosed USGS map. The Short range projects are expected to be completed by 2017, while the long range projects could extend as long as 2030.

This project review is needed for adoption of the RPMP and EIS Record of Decision. The enclosed project review package provides the information about the species, critical habitat, and bald eagles considered in our review, and the species conclusions table included in the package identifies our determinations for the resources that may be affected by the project.

For additional information, please contact me at the address listed above.

Sincerely,



Janet O'Neill
Carter's Run Environmental Corporation

Enclosures:

- 1) USFWS Project Review Package (IPaC)
- 2) USGS Map
- 3) Species Conclusion Table
- 4) Virginia Department of Conservation and Recreation National Heritage Program (VDCR-NHP Review Response)
- 5) Sensitive Joint Vetch Survey Report (VDCR-NHP)
- 6) Small Whorled Pogonia Survey Report (VDCR-NHP)(most recent)
- 7) Virginia Department of Game and Inland Fisheries response

- 8) VA Fish and Wildlife Information System database search
- 9) Bald Eagle Nest Locator Website Data

Cc: Marc Russell, Fort Belvoir ENRD
Penny Douglas, AECOM



U.S. Fish and Wildlife Service

Natural Resources of Concern

This resource list is to be used for planning purposes only — it is not an official species list.

Endangered Species Act species list information for your project is available online and listed below for the following FWS Field Offices:

VIRGINIA ECOLOGICAL SERVICES FIELD OFFICE
6669 SHORT LANE
GLOUCESTER, VA 23061
(804) 693-6694
<http://www.fws.gov/northeast/virginiafield/>

CHESAPEAKE BAY ECOLOGICAL SERVICES FIELD OFFICE
177 ADMIRAL COCHRANE DRIVE
ANNAPOLIS, MD 21401
(410) 573-4500

Project Name:

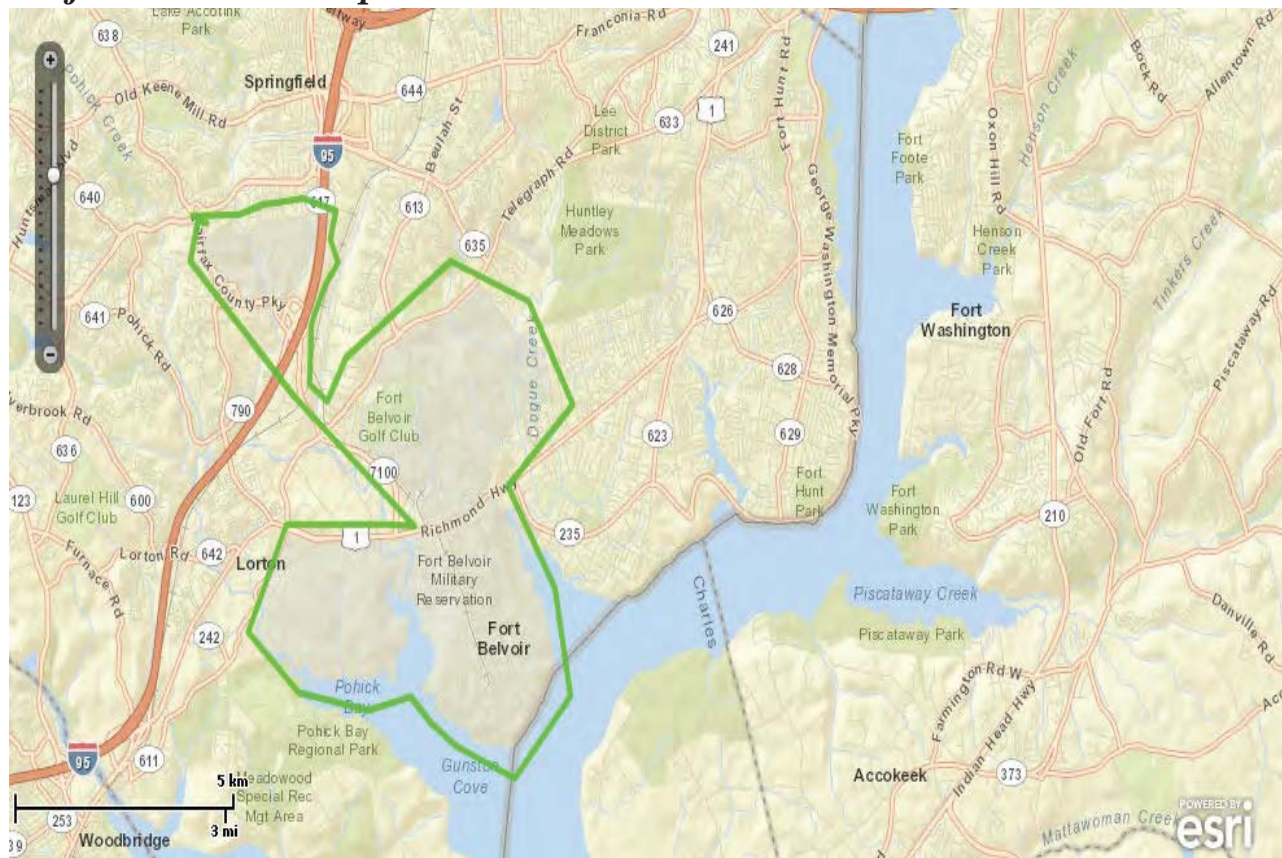
Fort Belvoir MP



U.S. Fish and Wildlife Service

Natural Resources of Concern

Project Location Map:



Project Counties:

Charles, MD | Fairfax, VA



Natural Resources of Concern

Geographic coordinates (Open Geospatial Consortium Well-Known Text, NAD83):

MULTIPOLYGON (((-77.2051815 38.7592341, -77.1990555 38.7608665, -77.1990519 38.7608671, -77.1940015 38.7612467, -77.1883753 38.761871, -77.1883686 38.7618706, -77.1796997 38.7598895, -77.1796922 38.759886, -77.1796868 38.7598798, -77.1796843 38.759872, -77.1796852 38.7598638, -77.1811931 38.7552673, -77.179103 38.7515131, -77.1791006 38.7515051, -77.1791016 38.7514967, -77.1791061 38.7514896, -77.1822118 38.7482511, -77.1839614 38.7455354, -77.1861046 38.7417778, -77.1866358 38.7320331, -77.1819757 38.7292101, -77.1770435 38.7362328, -77.1770368 38.7362388, -77.1492448 38.7517296, -77.1492372 38.751732, -77.1492292 38.7517312, -77.1286655 38.7453482, -77.1286596 38.7453453, -77.128655 38.7453406, -77.1169648 38.7287235, -77.1169617 38.7287166, -77.1169614 38.728709, -77.116964 38.7287018, -77.1169691 38.7286961, -77.1341365 38.7155967, -77.1216871 38.6991921, -77.1216835 38.6991846, -77.1175361 38.6818306, -77.1175358 38.6818235, -77.1175379 38.6818167, -77.1175423 38.6818111, -77.1323498 38.6685863, -77.1323557 38.6685826, -77.1323626 38.6685812, -77.1323695 38.6685822, -77.1478009 38.6737798, -77.1478043 38.6737813, -77.1544647 38.6775069, -77.1544673 38.6775087, -77.1598845 38.6817645, -77.1711365 38.679515, -77.1711435 38.6795148, -77.1895456 38.6824361, -77.1895542 38.6824397, -77.2029095 38.6921274, -77.2029146 38.6921327, -77.2029174 38.6921395, -77.2029175 38.6921468, -77.2029151 38.6921537, -77.1928042 38.7094222, -77.1927997 38.7094275, -77.1927937 38.7094309, -77.1927869 38.7094321, -77.1654069 38.7094589, -77.1654061 38.7094589, -77.1589554 38.709194, -77.1907662 38.7300285, -77.1907676 38.7300295, -77.218291 38.7517396, -77.2182962 38.7517458, -77.2182985 38.7517535, -77.2182976 38.7517615, -77.2162205 38.7581737, -77.2162173 38.7581798, -77.2162122 38.7581844, -77.2162058 38.758187, -77.2161989 38.7581873, -77.2140405 38.757901, -77.2158661 38.7586845, -77.2158725 38.7586889, -77.2158768 38.7586955, -77.2158782 38.7587032, -77.2158766 38.7587108, -77.2158722 38.7587172, -77.2158656 38.7587215, -77.2158579 38.7587229, -77.2158503 38.7587213, -77.2138912 38.7578805, -77.2138845 38.7578758, -77.2138803 38.7578689, -77.2138791 38.7578608, -77.2138813 38.757853, -77.2138864 38.7578466, -77.2138936 38.7578429, -77.2139017 38.7578423, -77.2161876 38.7581455, -77.2182553 38.7517624, -77.1907435 38.7300614, -77.1588728 38.7091877, -77.1588675 38.7091826, -77.1588644 38.7091759, -77.158864 38.7091685, -77.1588662 38.7091615, -77.1588709 38.7091557, -77.1588773 38.7091521, -77.1588846 38.709151, -77.1654073 38.7094189, -77.1927754 38.7093921, -77.2028714 38.6921491, -77.1895346 38.6824749, -77.1711408 38.6795549, -77.1598833 38.6818055, -77.1598748 38.6818054, -77.159867 38.6818016, -77.1544438 38.6775411, -77.1477864 38.6738172, -77.1323677 38.6686239, -77.1175778 38.681833, -77.1217215 38.6991713, -77.1341804 38.7155884, -77.1341838 38.7155954, -77.1341843 38.7156032, -77.1341818 38.7156106, -77.1341766 38.7156164, -77.1170086 38.7287162, -77.1286838 38.745312, -77.1492328 38.7516905, -77.1770134 38.7362061, -77.1819537 38.7291718, -77.1819591 38.7291666, -77.181966 38.7291637, -77.1819735 38.7291636, -77.1819805 38.7291662, -77.1866668 38.7320051, -77.1866721 38.7320098, -77.1866755 38.7320162, -77.1866764 38.7320233, -77.1861443 38.7417847, -77.1861417 38.7417935, -77.1839959 38.7455557, -77.1839953 38.7455566, -77.1822444 38.7482744, -77.182242 38.7482774, -77.1791452 38.7515066, -77.1812323 38.7552555, -77.1812347 38.7552633, -77.1812338 38.7552714, -77.17973 38.7598554, -77.1883743 38.7618308, -77.1939974 38.7612069, -77.1939981 38.7612069, -77.199047 38.7608274, -77.2051736 38.7591948, -77.2051783 38.7591941, -77.2182782 38.758964, -77.2182859 38.7589654, -77.2182925 38.7589696, -77.2182969 38.758976, -77.2182986 38.7589836, -77.2182972 38.7589913, -77.218293 38.7589979, -77.2182868 38.7590023, -77.218279 38.759004, -77.2051815 38.7592341)))



Natural Resources of Concern

Project Type:

Development

Endangered Species Act Species List ([USFWS Endangered Species Program](#)).

There are a total of 2 threatened, endangered, or candidate species, and/or designated critical habitat on your species list. Species on this list are the species that may be affected by your project and could include species that exist in another geographic area. For example, certain fishes may appear on the species list because a project could cause downstream effects on the species. Please contact the designated FWS office if you have questions.

Species that may be affected by your project:

Flowering Plants	Status	Species Profile	Contact
Sensitive joint-vetch (<i>Aeschynomene virginica</i>)	Threatened	species info	Virginia Ecological Services Field Office
Small Whorled pogonia (<i>Isotria medeoloides</i>)	Threatened	species info	Virginia Ecological Services Field Office

FWS National Wildlife Refuges ([USFWS National Wildlife Refuges Program](#)).

There are no refuges found within the vicinity of your project.

FWS Migratory Birds ([USFWS Migratory Bird Program](#)).

Most species of birds, including eagles and other raptors, are protected under the Migratory Bird Treaty Act (16 U.S.C. 703). Bald eagles and golden eagles receive additional protection under the [Bald and Golden Eagle Protection Act](#) (16 U.S.C. 668). The Service's [Birds of Conservation Concern \(2008\)](#) report identifies species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become listed under the Endangered Species Act as amended (16 U.S.C 1531 et seq.).



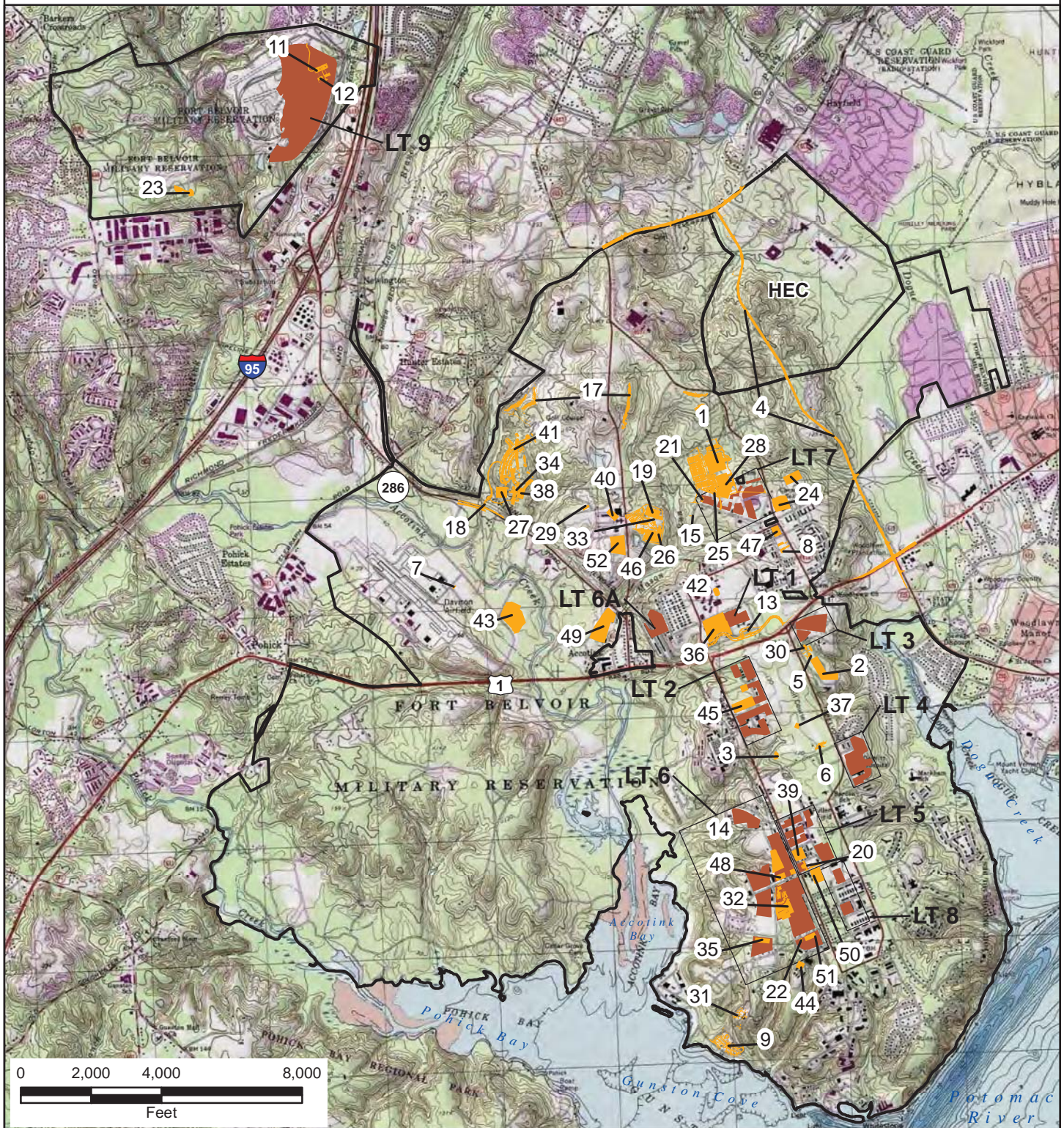
U.S. Fish and Wildlife Service

Natural Resources of Concern

NWI Wetlands ([USFWS National Wetlands Inventory](#)).

The U.S. Fish and Wildlife Service is the principal Federal agency that provides information on the extent and status of wetlands in the U.S., via the National Wetlands Inventory Program (NWI). In addition to impacts to wetlands within your immediate project area, wetlands outside of your project area may need to be considered in any evaluation of project impacts, due to the hydrologic nature of wetlands (for example, project activities may affect local hydrology within, and outside of, your immediate project area). It may be helpful to refer to the USFWS National Wetland Inventory website. The designated FWS office can also assist you. Impacts to wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes. Project Proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate [U.S. Army Corps of Engineers District](#).

Fort Belvoir - Proposed Projects



Legend

- Short-Term Project Sites
(Construction FY 2012 - 2017)
- Long-Term Project Sites
(Construction FY 2018 - 2030)



Fort Belvoir RPMP EIS



Species Conclusions Table

Project Name: Fort Belvoir Real Property Master Plan

Date: October 17, 2013

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
Small whorled pogonia (<i>Isotria medeoloides</i>)	Species present	No effect	<p>Fort Belvoir has conducted and will continue to conduct surveys for the small whorled pogonia on a project-by-project basis where there is potential habitat. To date, no plants have been found on the Main Post, but it has been observed on steep, oak-dominated forested slopes on a first order tributary of Accotink Creek in the southwestern part of the Fort Belvoir North Area (FBNA). This is the only location in Fairfax County where the species has been found. Potential habitat for the small whorled pogonia can be found along the western and southern boundaries of the FBNA (WSSI, 2005a; 2006). However, Fort Belvoir does not propose to allow any development to occur in these areas. The only potential future development area identified on the FBNA is east of the new NGA facility. See also letter dated August 16, 2013 from Alli Baird of the Virginia Department of Conservation and Recreation (VDCR) Natural Heritage Program.</p> <p>The most recent small whorled pogonia survey was conducted by VDCR-Natural Heritage Program staff, who surveyed proposed sites of new or updated water and sewer lines mostly on the portion of Fort Belvoir south of US 1 (two survey areas bordered US 1 on its north side) during the 2011 and 2012 survey seasons. The survey was conducted in areas of high and medium potential habitat. No individuals were found (letter dated July 16, 2012 from Nancy Van Alstine, VDCR-NHP, to Sybille Vega, Fort Belvoir ENRD).</p>
Sensitive joint-vetch (<i>Aeschynomene virginica</i>)	Species potentially present	No effect	<p>The species shows up on the USFWS Official Species List, but has not yet been found on Fort Belvoir. VDCR-NHP did not identify sensitive joint vetch in its database search (letter dated August 16, 2013 from Alli Baird of the VDCR Natural Heritage Program). The VDCR-NHP surveyed suitable habitats on the post – the fresh tidal marsh habitat of the lower Pohick Creek, Accotink Creek, and Dogue Creek drainages – for sensitive joint-vetch (<i>Aeschynomene virginica</i>) during the 2011- 2012 field seasons, but none was found (Van Alstine, April 2013b).</p> <p>The thrust of the Real Property Master Plan is to reserve large tracts of buildable areas for future campuses and/or phased infill type development. These buildable areas have been configured to the extent feasible to avoid of the ecologically sensitive areas. None of the projects envisioned in the Real Property Master Plan would impact any freshwater or slightly brackish tidal habitat where</p>

Bald eagle	Species present. Unlikely to disturb nesting bald eagles. Does intersect with eagle concentration area.	Eagle Act permit may be required.	sensitive joint vetch is usually found.
<p>We have been unable to access the Center for Conservation Biology Eagle Nest Locator. However, based on information obtained from that site in July 2013, and on information provided by John Pilicki of the Fort Belvoir ENRD, there are four active nests on Fort Belvoir, all on South Post. Two are located within the Southwest Area, one along the Dogue Creek shoreline, and one on the Potomac River shoreline near the mouth of Dogue Creek. Everyone of these nests fledged at least one chick during the 2013 season (Pilicki, September 2013). There is also a nest across Gunston Cove on Mason Neck (Center for Conservation Biology Eagle Nest Locator Website, July 2013).</p> <p>Accotink Bay Wildlife Refuge is a high-use foraging area with the greatest eagle activity occurring during the winter. Bald eagles also forage within the Jackson Miles Abbott Wetland Refuge. The Belvoir shoreline is part of the Mason Neck Eagle Concentration Area. The only project with a potential to impact bald eagle habitat would be Phase 1 of the Family Travel Camp. An existing parking lot near along the Gunston Cove shoreline would be upgraded to provide parking for RVs. The parking lot underlies the eagle foraging habitat associated with the Mason Neck Eagle Concentration Area. The impact would be minor although long-term; the use of this site, which once housed buildings and a parking lot, for RV parking represents an increase in human activities in this area, but is unlikely to interfere with eagle foraging offshore. None of the short (or long)-term projects are within the strictest recommended limits under the Virginia bald eagle guidelines, namely within 1,320 feet of the nests in the Southwest Area, the Potomac and Dogue Creek shorelines, or the nest across Gunston Cove on Mason Neck.</p>			

**Surveys for Sensitive Joint-Vetch (*Aeschynomene virginica* (L.) B.S.P.) in 2011-2012 at
U.S. Army Garrison Fort Belvoir, Virginia**

FINAL REPORT

Natural Heritage Technical Report 13-06

April 2013

Prepared by:

Nancy E. Van Alstine
Virginia Department of Conservation and Recreation
Division of Natural Heritage
217 Governor Street
Richmond, VA 23219

Submitted to:

U.S. Army Garrison Fort Belvoir
Directorate of Public Works
Environmental and Natural Resources Division
9430 Jackson Loop
Fort Belvoir, Virginia 22060

This report should be cited as:

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TABLE OF CONTENTS

ACKNOWLEDGMENTS	ii
SUMMARY	iii
INTRODUCTION	1
METHODOLOGY	3
RESULTS.....	7
CONCLUSION	8
LITERATURE CITED	9

APPENDIX

APPENDIX 1: Definitions of Abbreviations Used on Natural Heritage Resource Lists
of the Virginia Department of Conservation and Recreation

LIST OF FIGURES

Figure 1. Location of U.S. Army Garrison Fort Belvoir, Fairfax County, Virginia	2
Figure 2. Global distribution of <i>Aeschynomene virginica</i>	3
Figure 3. Survey routes for sensitive joint-vetch (<i>Aeschynomene virginica</i>) within the Pohick Creek-Accotink Creek marshes of Fort Belvoir in 2011-2012	5
Figure 4. Survey route for sensitive joint-vetch (<i>Aeschynomene virginica</i>) within Dogue Creek downstream from Rt. 235 on Fort Belvoir in 2011.....	6

ACNOWLEDGMENTS

This work was funded by U.S. Army Garrison Fort Belvoir, under the Natural Resource Survey Project, Contract # W91QV1-11-P-0250.

Within Fort Belvoir, Sybille Vega administered the project and John Pilcicki provided logistical and survey assistance for the field work. Jill Gaspar provided GIS layers useful in field planning.

Within the Virginia Department of Conservation and Recreation's Division of Natural Heritage, J. Christopher Ludwig administered the project, John Townsend conducted the resurvey of Accotink Bay/Creek in 2012 and reviewed this report, Elizabeth Crocker managed financial affairs, Cathy Milholen compiled the existing rare species data for Fort Belvoir present in Biotics, and Faye McKinney handled logistical and administrative tasks.

SUMMARY

In 2011 and 2012, under the Natural Resource Survey Project, Contract # W91QV1-11-P-0250, surveys were conducted by the Virginia Department of Conservation and Recreation's Division of Natural Heritage for the federal and state listed plant sensitive joint-vetch (*Aeschynomene virginica*) in U.S. Army Garrison Fort Belvoir, Virginia. Sensitive joint-vetch, federally listed threatened and, in Virginia, state listed threatened, a tall annual herb in the pea family (Fabaceae), occurs in freshwater to slightly brackish wetland habitats, primarily marshes, in the intertidal zone of major coastal rivers in Virginia, Maryland, and New Jersey. Pohick Bay and lower sections of Pohick Creek, Accotink Bay and lower Accotink Creek, and lower Dogue Creek were targeted for surveys which were conducted by kayak in October 2011. Appropriate habitat was found on Accotink Bay/Creek, Pohick Bay/Creek, and to a more limited extent on lower Dogue Creek. No sensitive joint-vetch was found in 2011, but a high rainfall/flooding event in September 2011 had flattened marsh vegetation most severely in Accotink Bay/Creek where the habitat with the highest potential was present. Due to these unfavorable survey conditions in 2011, Accotink Bay/Creek was surveyed again in August 2012, mainly by kayak, but also by a foot survey that reached some marsh habitat further upstream. No sensitive joint-vetch was found at this time either.

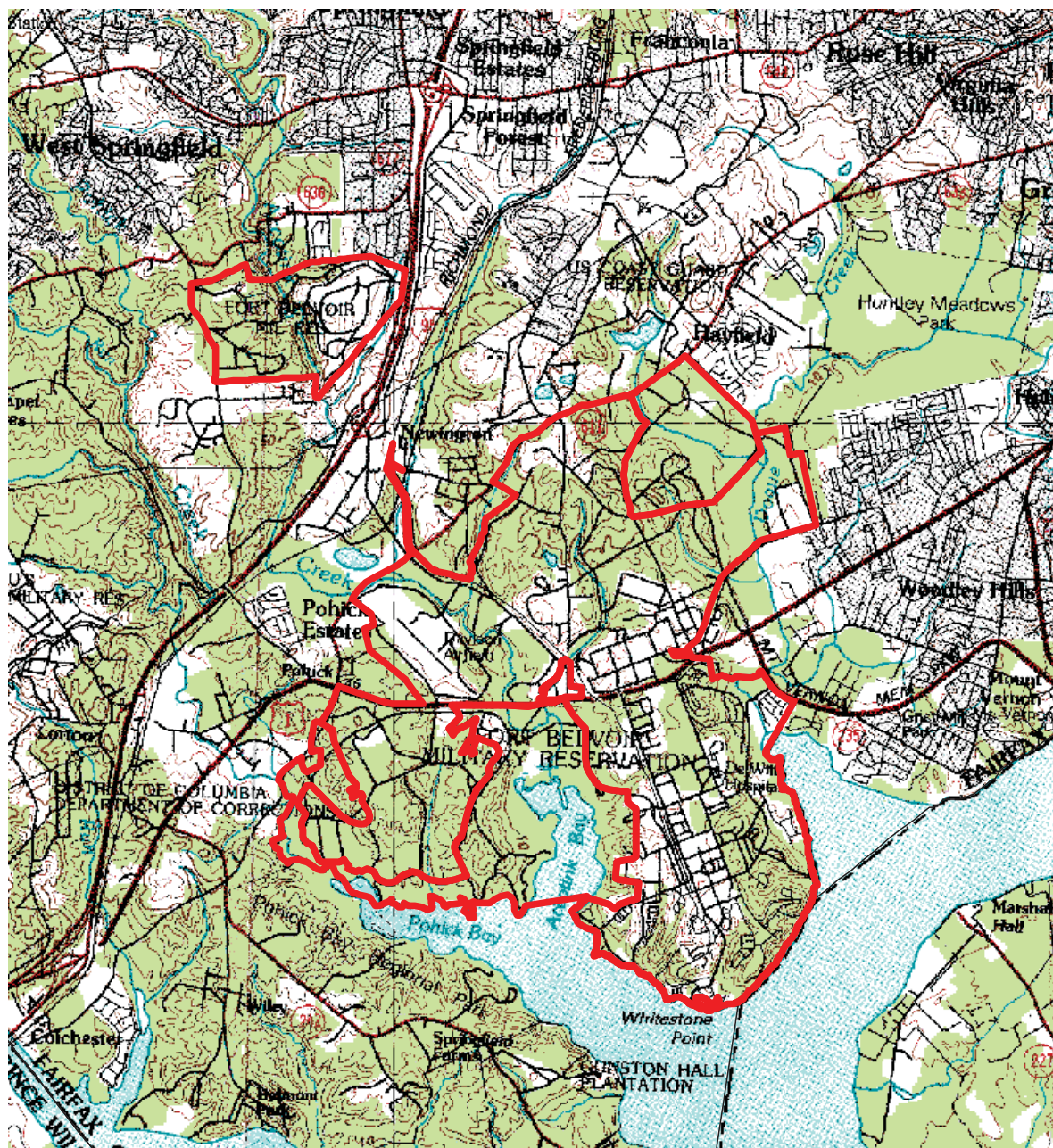
INTRODUCTION

In 2011, U.S. Army Garrison Fort Belvoir contracted with the Virginia Department of Conservation and Recreation, Division of Natural Heritage (DCR-DNH) to conduct natural resources surveys on the Fort for threatened and endangered species during the 2011-2012 field seasons. One of those species targeted is the federal and state listed plant species sensitive joint-vetch (*Aeschynomene virginica*, G2/S2/LT/LT). This report documents the surveys conducted for sensitive joint-vetch on Fort Belvoir by DCR-DNH during the 2011-2012 field seasons.

U.S. Army Garrison Fort Belvoir is located in southeastern Fairfax County in northern Virginia, south of Washington, D.C., and bordered on the east, southeast, and east respectively by Dogue Creek, the Potomac River, and Pohick Bay (Figure 1). Most of the Fort lies east of I-95 within the Northern Coastal Plain physiographic province with the Proving Ground section, west of I-95, within the Northern Piedmont.

Sensitive joint-vetch, a tall annual herb in the pea family (Fabaceae), occurs in freshwater to slightly brackish wetland habitats, primarily marshes, in the intertidal zone of major coastal rivers in Virginia, Maryland, and New Jersey (Figure 2). It also has been found in North Carolina, in ditches and wet fields, although these are not considered stable populations (NatureServe 2013). It is known historically from Delaware and Pennsylvania. In Virginia, the plant has been documented within the Chickahominy, James, Mattaponi, Pamunkey, Rappahannock, and Potomac Rivers. The nearest population that has been documented on the Potomac River lies approximately 20 miles downstream from Fort Belvoir (Virginia Department of Conservation and Recreation 2013). Sensitive joint-vetch tends to be found near raised banks such as along channels within the marsh, but can also be found in the interior. Typical associated species include southern wild rice (*Zizania aquatica*), swamp barnyard grass (*Echinochloa walteri*), tidal-marsh amaranth (*Amaranthus cannabinus*), rice cutgrass (*Leersia oryzoides*), smooth bur-marigold (*Bidens laevis*), pickerelweed (*Pontederia cordata*), orange jewelweed (*Impatiens capensis*), smartweeds (*Persicaria* spp.), swamp rose-mallow (*Hibiscus moscheutos*), swamp milkweed (*Asclepias incarnata*), and the non-native invasive marsh dewflower (*Murdannia keisak*) (Virginia Department on Conservation and Recreation 2013). Virginia supports the majority of the extant occurrences. Plants bloom from July through September, and fruits are produced from July to October.

DCR-DNH is the state agency responsible by statutory authority under the Virginia Natural Area Preserves Act (Section 10.1-209 through 217, *Code of Virginia*) for inventory, database maintenance, protection, and management of Virginia's Natural Heritage Resources. These resources are defined as the habitats of rare, threatened, or endangered plant and animal species, rare or state significant communities, and other natural features. See Appendix 1 for an explanation of the abbreviations used to describe global and state rarity ranks of Natural Heritage Resources mentioned within this report. The Division's work represents the first comprehensive attempt to identify the Commonwealth's most significant natural areas through ongoing scientific biological survey. Data gathered during this state-wide survey are assembled and managed using a sophisticated database management system, Biotics 4, in which information on ecosystems and species, their biology, habitats, locations, conservation status, and management needs is continually updated and refined. The Division is part of an international network of biological inventories known as natural heritage programs or conservation data centers, operating in all 50 U.S. states, Canada, Latin America and the Caribbean. This network of natural heritage programs uses standardized inventory methodologies and the Biotics data management system, an advanced geographic information systems-based software tool for managing biodiversity information developed and maintained by NatureServe (www.natureserve.org).



Boundary of U.S. Army Garrison Fort Belvoir



Figure 1. Location of U.S. Army Garrison Fort Belvoir, Fairfax County, Virginia. Washington West USGS 1:100, 000 quadrangle.

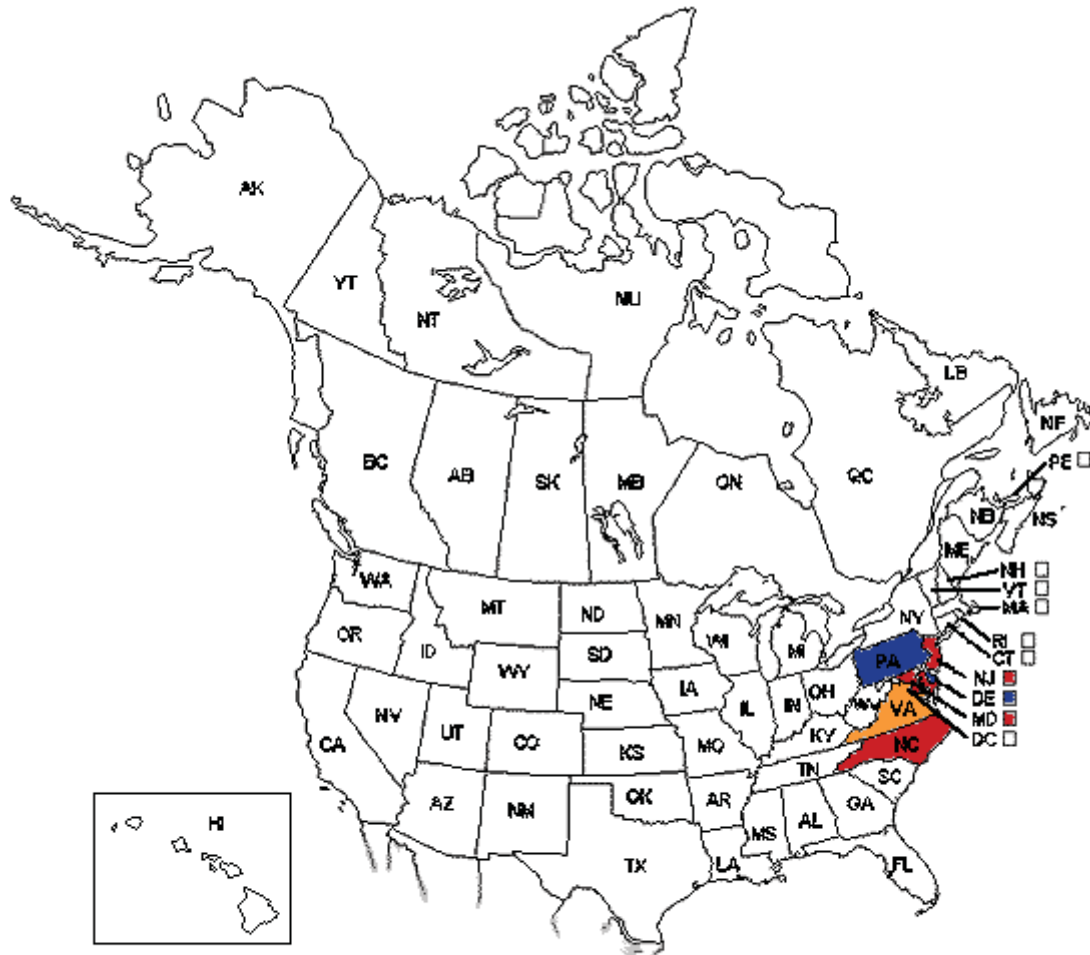


Figure 2. Global distribution of *Aeschynomene virginica*. Color indicates state/province conservation status with red = critically imperiled (S1), orange = imperiled (S2), and dark blue = presumed extirpated (SX). (See Appendix 1 for explanation of conservation status ranks.) Map and associated information was taken from NatureServe (2013).

METHODOLOGY

The scope of work for this project identified the areas known to have or likely to have appropriate habitat within Fort Belvoir as Dogue Creek, Pohick Bay, and Accotink Bay, and possibly the shoreline of the Potomac River. Previous DCR-DNH field work conducted in the tidal wetlands of Fort Belvoir by DCR-DNH was reviewed including the natural heritage inventory conducted in 1994-1995 (Hobson 1996) and the ecological community work done in 1999 by McCoy and Fleming (2000). No sensitive joint-vetch was found in that earlier work.

The optimal survey time for sensitive joint-vetch in Virginia is recommended by the U.S. Fish and Wildlife Service, Virginia Field Office, as August 15-October 15 (U. S. Fish and Wildlife Service 2013).

At this time the plant is in flower or fruit and has attained some stature making it more visible during the surveys typically conducted from a boat.

Most of the field work was conducted in October 2011 by DCR-DNH Field Botanist Nancy E. Van Alstine with assistance from John Pilcicki of Fort Belvoir. The survey was conducted by kayak and using binoculars to scan back portions of the marshes. Areas of marsh habitat along Pohick Bay, lower Pohick Creek, and Accotink Bay and lower Accotink Creek were surveyed on October 5 (Figure 3). Other parts of Accotink Creek were returned to and explored on October 11. Marshes in Dogue Creek downstream from Rt. 235 were surveyed on October 11 (Figure 4). Advice was sought from John Pilcicki on the presence of appropriate habitat along the Potomac River shoreline bordering Fort Belvoir and based on his knowledge it was determined that appropriate tidal marsh habitat does not exist there. Due to the flooding that occurred in September 2011 after an 11-inch rain event wherein some areas of marsh vegetation were flattened in Accotink Bay in the highest potential sensitive joint-vetch habitat, this area was resurveyed on August 23, 2012, by DCR-DNH Staff Botanist John Townsend, accompanied by John Pilcicki. The lower portions were surveyed by kayak in 2012, but access was gained to some more upstream marsh habitat by means of the recreational trail system in the Accotink Creek area (Figure 3).

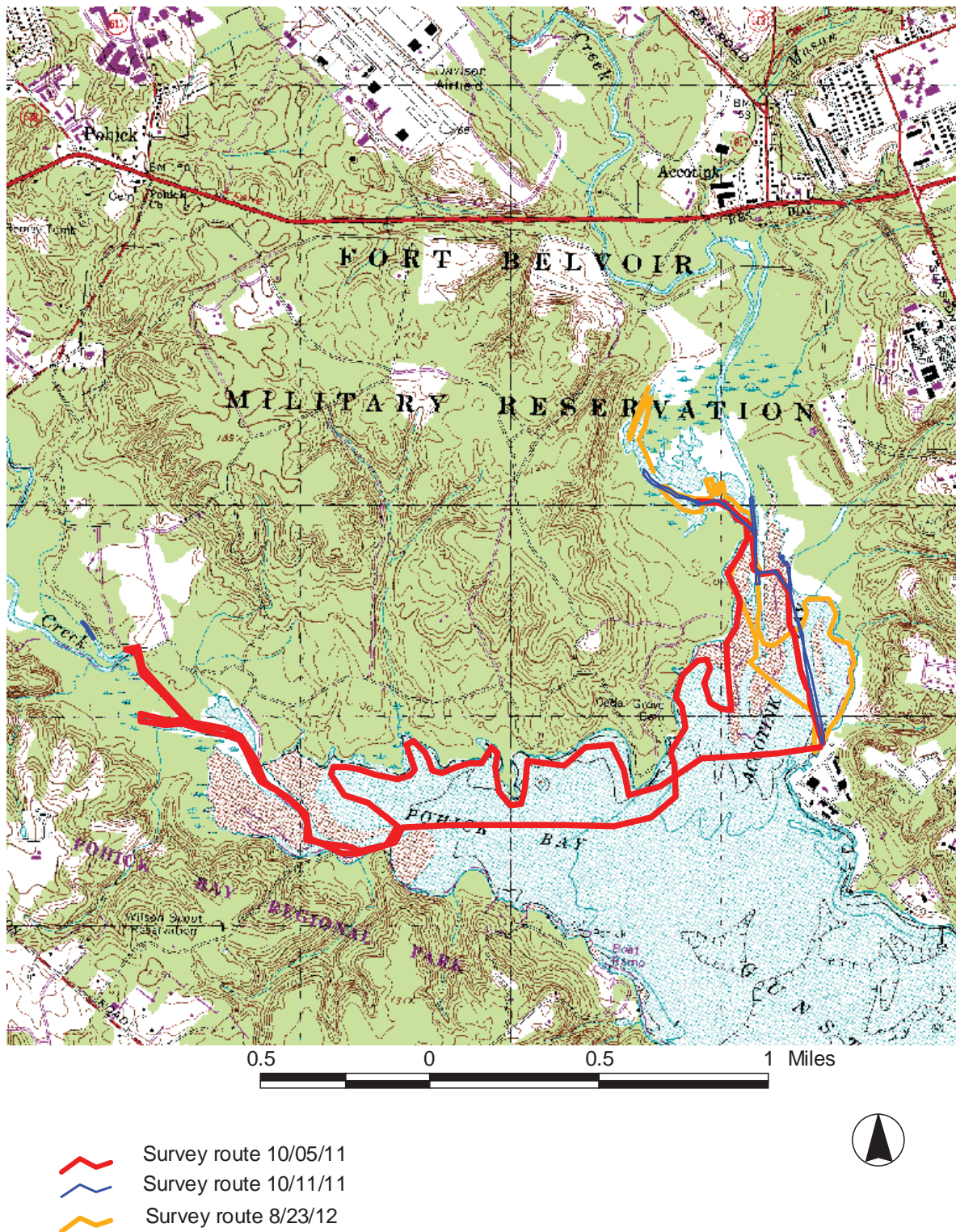


Figure 3. Survey routes for sensitive joint-vetch (*Aeschynomene virginica*) within the Pohick Creek-Accotink Creek marshes of Fort Belvoir in 2011-2012. Fort Belvoir and Mount Vernon USGS 7.5' quadrangles.

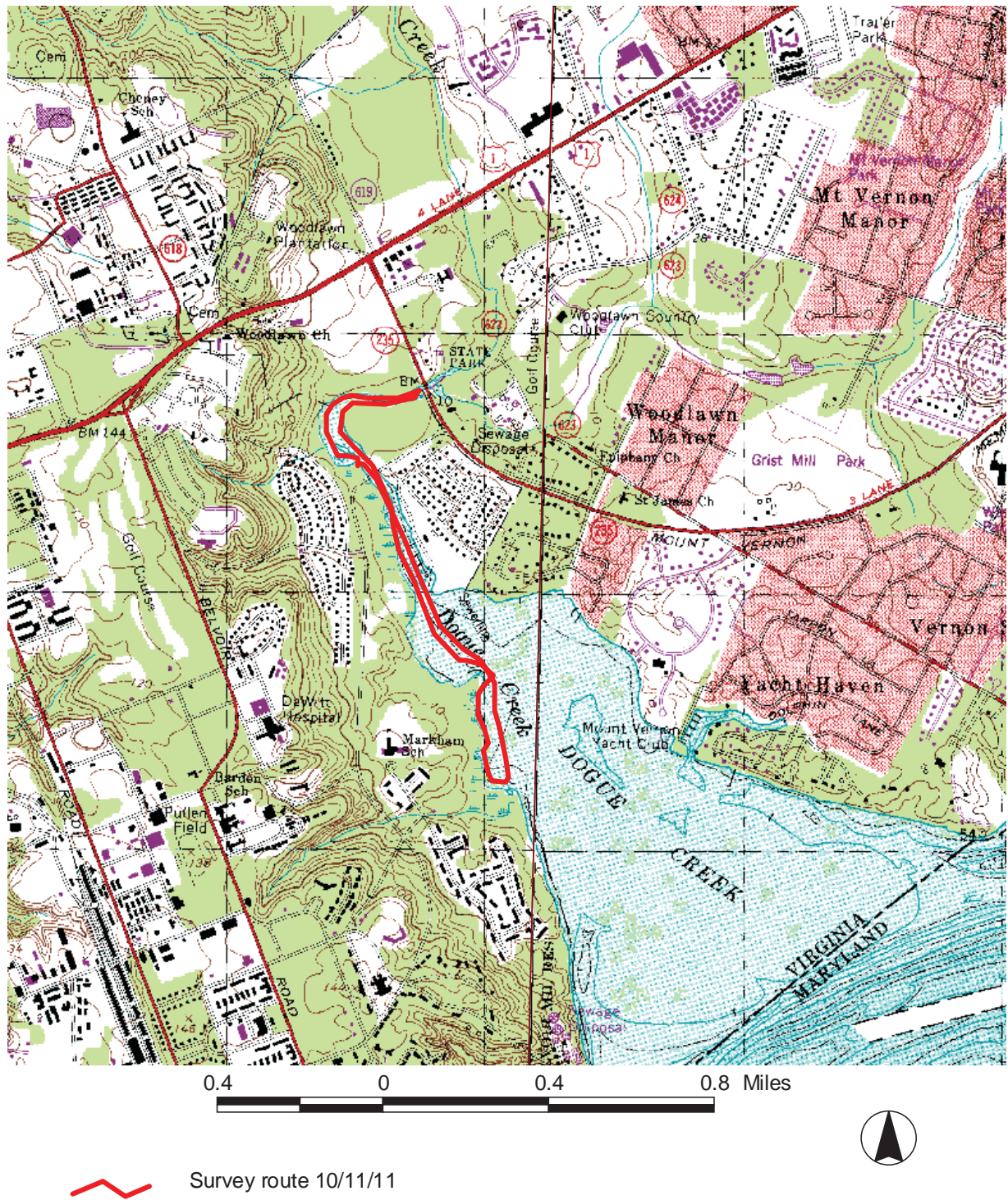


Figure 4. Survey route for sensitive joint-vetch (*Aeschynomene virginica*) within Dogue Creek downstream from Rt. 235 on Fort Belvoir in 2011. Fort Belvoir and Mount Vernon USGS 7.5' quadrangles.

RESULTS

Pohick-Accotink Wetlands

This area lies within the section of Fort Belvoir designated as the Accotink Bay Wildlife Refuge, which is composed of wetlands and uplands associated with Accotink Creek and Pohick Creek, tributaries of the Potomac River on the southern part of the Fort. The portion of Fort Belvoir bordering the north side of Pohick Bay contained some narrow fringes of marsh and pocket marshes with zones or more intermixed areas of yellow cow lily (*Nuphar advena*), pickerelweed (*Pontederia cordata*), and southern wild rice (*Zizania aquatica*), smartweeds or tearthumbs (*Persicaria* = *Polygonum* spp.), beggar-ticks (*Bidens* spp.), and swamp rose-mallow (*Hibiscus moscheutos*). Wider areas of tidal marsh containing the preceding species lie mostly outside the boundary of Fort Belvoir within the broader Pohick Bay and these were also scanned for sensitive joint-vetch as the survey continued upstream into tidal marsh habitat within Fort Belvoir that was accessible by kayak.

An upstream area on Pohick Creek, the farthest upstream that was surveyed by kayak in 2011, and a bit farther upstream where a brief visit on foot was made in 2011, is mapped in the DCR-DNH database as supporting the state rare plant river bulrush (*Bolboschoenus fluviatilis* = *Schoenoplectus fluviatilis*, G5/S2/NL/NL) and tidal marsh habitat (Lea 1995); this area had been heavily impacted by the September 2011 flooding, but on the 2011 visit the floodplain, although open, looked to be at a higher elevation and not marshy. After further review of the original source material and consultation with a DCR-DNH zoologist Chris Hobson who has conducted recent zoological surveys in the upstream area, it is likely that the tidal marsh habitat observed in 1995 is further downstream, part of the area surveyed for sensitive joint-vetch by kayak in October 2011. River bulrush was not noted, but may have been overlooked if it was batten-down from the flooding.

Within Accotink Bay near its southern end, there were fringes of marsh with switchgrass (*Panicum virgatum*) and a sterile bulrush (*Bolboschoenus* sp. = *Schoenoplectus* sp.) and then zones of yellow cow lily with scattered southern wild rice behind it. Continuing upstream pocket marshes occurred characterized by southern wild rice, common cattail (*Typha latifolia*), pickerelweed, and beggar-ticks (*Bidens* sp.) and the sterile bulrush. The marsh habitat broadened out farther upstream but it also became more difficult to proceed with a kayak survey, even at high tide, due to shallow waters. The bulrush species was widespread but as it was only in a sterile form it can only be assumed that it was the river bulrush (*Bolboschoenus fluviatilis*) documented in the 1995 survey. A stretch of the highly invasive common reed (*Phragmites australis* var. *australis*) was observed on the eastern side of the marsh. The wider marsh area contained cattails, river bulrush, yellow cow lily, and smartweed species. Foot surveys were not done within the marsh in 2011 so this represents only a portion of the species present.

Other rarities that were documented in the marshes in Accotink Bay during the earlier natural heritage inventory in 1995 include marsh pea (*Lathyrus palustris*) and water-plantain crowfoot (*Ranunculus ambigens*); these were not present in the areas targeted for sensitive-joint vetch surveys in 2011–2012. The narrow time frame of high tide conditions that allowed the kayak survey necessitated restricting the focus of the survey to sensitive joint-vetch rather than updating other rarities not present within the immediate survey areas.

Dogue Creek

The section of Dogue Creek downstream from the Rt. 235 (Mount Vernon Memorial Highway) bridge was kayaked in search of sensitive joint-vetch. Trees--sycamore (*Platanus occidentalis*), red maple (*Acer rubrum*), river birch (*Betula nigra*), etc.-- or yellow pond lily (*Nuphar advena*)-dominated zones line much of this lower section of Dogue Creek. A marina occupies the eastern shore south of the Mount Vernon Road bridge. Areas of appropriate fresh to slightly brackish tidal marsh habitat for sensitive joint-vetch were present but very limited. Species in the marshes included cattail (*Typha* spp.), pickerelweed

(*Pontederia cordata*), swamp rose-mallow (*Hibiscus moscheutos*), smooth bur-marigold (*Bidens* cf. *laevis*), arrow-leaf tearthumb (*Persicaria sagittata* = *Polygonum sagittatum*), halberd-leaf tearthumb (*Persicaria arifolia* = *Polygonum arifolium*) tidal-marsh amaranth (*Amaranthus cannabinus*), swamp milkweed (*Asclepias incarnata*), and young sycamore (*Platanus occidentalis*). Some of the highly invasive exotic grass common reed (*Phragmites australis* var. *australis*) was noted back near the tree line on the western side north of the Mount Vernon Road Bridge. No sensitive joint-vetch or any other plant rarities were observed.

CONCLUSION

Although the fresh tidal marsh habitat of sensitive joint-vetch occurs on Fort Belvoir within the lower Pohick Creek and Accotink Creek drainages and to a lesser extent on lower Dogue Creek, no sensitive joint-vetch was found in the 2011-2012 surveys, similar to findings in surveys by DCR-DNH and others in previous years.

LITERATURE CITED

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- McCoy, K.M. and G.P. Fleming. 2000. Ecological Communities of U.S. Army Garrison, Fort Belvoir, Fort Belvoir, Virginia. Natural Heritage Technical Report 00-08. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond. Unpublished report submitted to the U.S. Army Fort Belvoir. 156 pp. plus appendices.
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- Virginia Department of Conservation and Recreation. 2013. Biotics 4.0 database, Virginia Department of Conservation and Recreation, Division of Natural Heritage. Richmond.

APPENDIX 1:

Definitions of Abbreviations Used on Natural Heritage Resource Lists
of the Virginia Department of Conservation and Recreation

**Definitions of Abbreviations Used on Natural Heritage Resource Lists
of the
Virginia Department of Conservation and Recreation**

Natural Heritage State Ranks

The following ranks are used by the Virginia Department of Conservation and Recreation to set protection priorities for natural heritage resources. Natural Heritage Resources, or "NHR's," are rare plant and animal species, rare and exemplary natural communities, and significant geologic features. The criterion for ranking NHR's is the number of populations or occurrences, i.e. the number of known distinct localities; the number of individuals in existence at each locality or, if a highly mobile organism (e.g., sea turtles, many birds, and butterflies), the total number of individuals; the quality of the occurrences, the number of protected occurrences; and threats.

S1 - Critically imperiled in the state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state. Typically 5 or fewer populations or occurrences, or very few remaining individuals (<1000).

S2 - Imperiled in the state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state. Typically 6 to 20 populations or occurrences or few remaining individuals (1,000 to 3,000).

S3 - Vulnerable in the state either because rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation. Typically having 21 to 100 populations or occurrences (1,000 to 3,000 individuals).

S4 - Apparently secure; Uncommon but not rare, and usually widespread in the state. Possible cause of long-term concern. Usually having >100 populations or occurrences and more than 10,000 individuals.

S5 - Secure; Common, widespread and abundant in the state. Essentially ineradicable under present conditions, typically having considerably more than 100 populations or occurrences and more than 10,000 individuals.

S#B - Breeding status of an animal within the state

S#N - Non-breeding status of animal within the state. Usually applied to winter resident species.

S#? - Inexact or uncertain numeric rank.

SH - Possibly extirpated (Historical). Historically known from the state, but not verified for an extended period, usually > 15 years; this rank is used primarily when inventory has been attempted recently.

S#S# - Range rank; A numeric range rank, (e.g. S2S3) is used to indicate the range of uncertainty about the exact status of the element. Ranges cannot skip more than one rank.

SU - Unrankable; Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

SNR - Unranked; state rank not yet assessed.

SX - Presumed extirpated from the state. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.

SNA - A conservation status rank is not applicable because the element is not a suitable target for conservation activities.

Natural Heritage Global Ranks are similar, but refer to a species' rarity throughout its total range. Global ranks are denoted with a "G" followed by a character. Note GX means the element is presumed extinct throughout its range. A "Q" in a rank indicates that a taxonomic question concerning that species exists. Ranks for subspecies are denoted with a "T". The global and state ranks combined (e.g. G2/S1) give an instant grasp of a species' known rarity. **These ranks should not be interpreted as legal designations.**

FEDERAL LEGAL STATUS

The Division of Natural Heritage uses the standard abbreviations for Federal endangerment developed by the U.S. Fish and Wildlife Service, Division of Endangered Species and Habitat Conservation.

LE - Listed Endangered

LT - Listed Threatened

PE - Proposed Endangered

PT - Proposed Threatened

C - Candidate (formerly C1 - Candidate category 1)

E(S/A) - treat as endangered because of similarity of appearance

T(S/A) - treat as threatened because of similarity of appearance

SOC - Species of Concern species that merit special concern (**not a regulatory category**)

NL - no federal legal status

STATE LEGAL STATUS

The Division of Natural Heritage uses similar abbreviations for State endangerment.

LE - Listed Endangered

PE - Proposed Endangered

SC - Special Concern - animals that merit special concern according to VDGIF (not a regulatory category)

LT - Listed Threatened

PT - Proposed Threatened

C - Candidate

NL - no state legal status

For information on the laws pertaining to threatened or endangered species, please contact:

U.S. Fish and Wildlife Service for all **FEDERALLY** listed species;

Department of Agriculture and Consumer Services, Plant Protection Bureau for **STATE** listed plants and insects

Department of Game and Inland Fisheries for all other **STATE** listed animals

Conservation Sites Ranking

Brank is a rating of the significance of the conservation site based on presence and number of natural heritage resources; on a scale of 1-5, 1 being most significant. Sites are also coded to reflect the presence/absence of federally/state listed species:

Conservation Site Ranks

B1 - Outstanding significance

B2 - Very High significance

B3 - High significance

B4 - Moderate significance

B5 - Of general Biodiversity significance

Legal Status of Site

FL - Federally listed species present

SL - State listed species present

NL - No listed species present



COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

Division of Natural Heritage
217 Governor Street
Richmond, Virginia 23219-2010
(804) 786-7951

July 16, 2012

Ms. Sybille Vega
Wetlands and Habitat Program Manager
U.S. Army Garrison Fort Belvoir
Directorate of Public Works
9430 Jackson Loop
Fort Belvoir, Virginia 22060-5116

Dear Ms. Vega:

In 2011, Fort Belvoir contracted (W91QV1-11-P-0250) with the Virginia Department on Conservation and Recreation's Division of Natural Heritage to conduct natural resources surveys on the Fort for threatened and endangered species during the 2011-2012 field seasons. One of those species targeted is the federal and state listed plant species small whorled pogonia (*Isotria medeoloides*). Fort Belvoir natural resource staff specified the areas to be surveyed based on proposed sites of new or updated water and sewer lines mostly on the portion of Fort Belvoir south of US 1; two survey areas bordered US 1 on its north side. Habitat in the designated areas had been previously mapped and evaluated as to whether it had high, medium, or low potential for small whorled pogonia. It was agreed that only those areas of high and medium potential would be surveyed for the species.

The surveys for small whorled pogonia in 2012 have now been completed. See the attached map generated by Fort Belvoir for the locations of those areas surveyed with high and medium potential. Surveys were conducted between May 22 and July 5 by me, DCR-DNH Field Botanist Nancy E. Van Alstine, with frequent assistance from Fort Belvoir Natural Resources Specialist John Pilcicki. American Water representatives accompanied us on a number of the surveys. The surveys were conducted mostly during the June 1-July 20 survey period recommended for this species in northern Virginia by the U.S. Fish and Wildlife Service, but due to the unusually mild winter and spring, it was felt that surveys could safely begin a week early. No small whorled pogonia was found in any of the survey areas. The depauperate nature of the herbaceous layer was noted in many of the areas, presumably a result of deer browse.

In addition to the sites shown on the map, several other areas requested by Fort Belvoir staff were surveyed including the known location for small whorled pogonia in north Fort Belvoir and a proposed building site north of 9th Street. No small whorled pogonia was found in either of these locations. Additional areas along Gillespie Road near Mount Vernon Road that Lenny White of American Water mentioned as possible work zones were viewed and found to have low to no potential.

If you have any questions about this survey, please contact me. A full report on this work will be completed later.

Sincerely,

Nancy

Nancy E. Van Alstine
Field Botanist
Virginia Department of Conservation and Recreation
Division of Natural Heritage
217 Governor Street
Richmond, VA 23219
Office (804) 371-2840
Fax (804) 371-2674
Nancy.vanalstine@dcv.virginia.gov

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Janet O'Neill

From: JanetO'Neill <janet1118@verizon.net>
Sent: Monday, July 22, 2013 1:58 PM
To: ProjectReview@dgif.virginia.gov
Cc: Penny.Douglas@aecom.com
Subject: Project Review - Fort Belvoir Real Property Master Plan
Attachments: Fort_Belvoir_USGS_Project_Map.pdf; Belvoir Main Post VaFWIS Map.pdf; Belvoir Main Post VaFWIS Geographic Species List.pdf; FBNA - VaFWIS Map.pdf; FBNA - VaFWIS GeographicSpecies List .pdf

Carter's Run Environmental Corporation

To Whom It May Concern:

The Army is in the process of developing a new Real Property Master Plan (RPMP) for Fort Belvoir's Main Post and the Fort Belvoir North Area (FBNA). They are also preparing an EIS to address adoption of the RPMP, and implementation of the plan's proposed short-term (2012 – 2017) development projects. The EIS will also, to the extent that we have information, address ten long-range development and ten long-range transportation improvement projects.

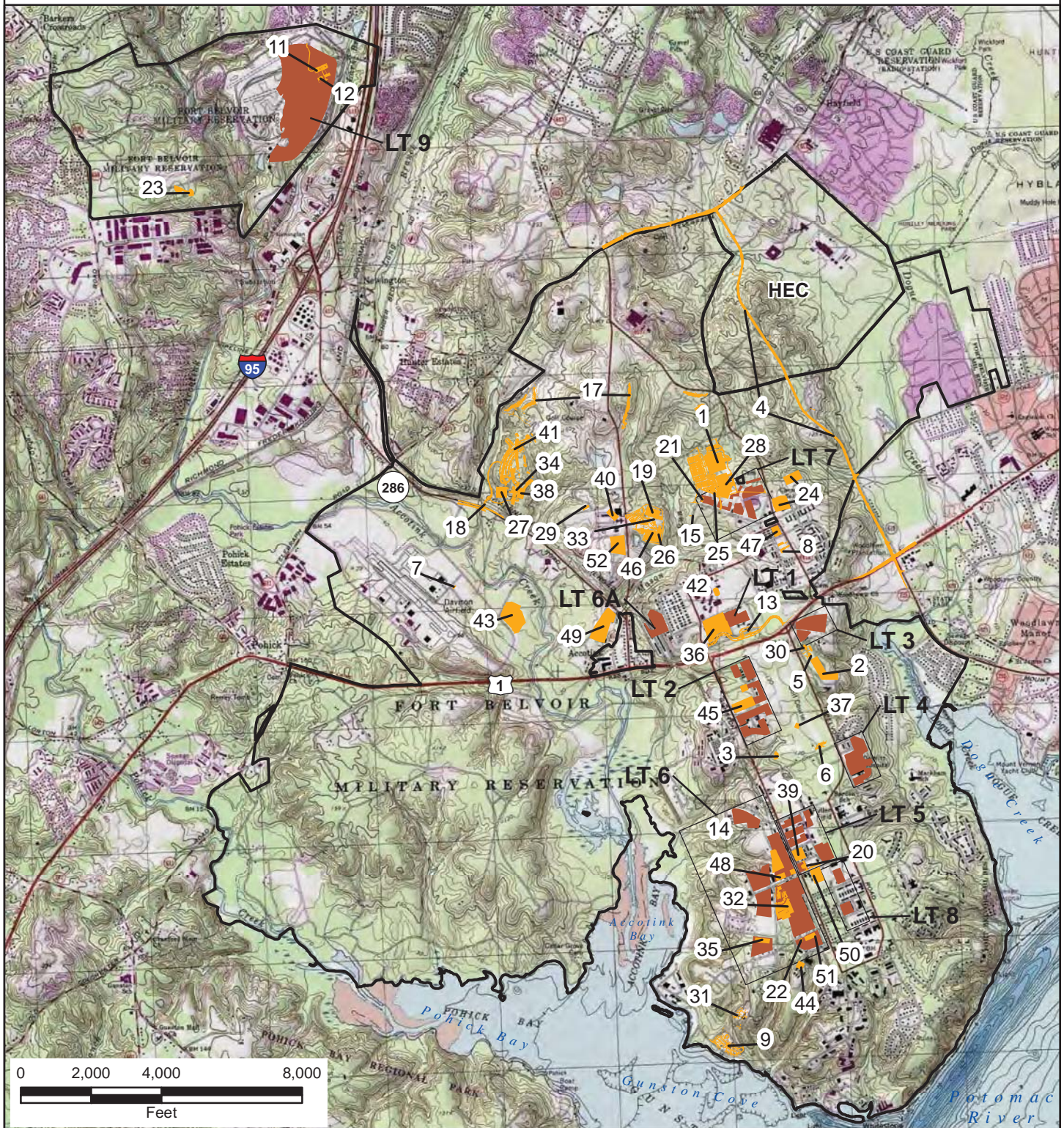
Attached is a USGS map showing the location of Fort Belvoir (Main Post and the North Area), as well as an Initial Project Assessment reports centered on both the Main Post and the FBNA from the VAFWIS. Please contact me (540-219-0322) if you need more information.

Thank-you!

Janet C. O'Neill

Carter's Run Environmental Corporation, 7137 Wilson Road, Marshall, VA 20115

Fort Belvoir - Proposed Projects



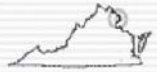
Legend

- Short-Term Project Sites
(Construction FY 2012 - 2017)
- Long-Term Project Sites
(Construction FY 2018 - 2030)



Fort Belvoir RPMP EIS




[back](#)
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Map
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38,42,12.4 -77,09,52.3

is the Search Point

Search Point

- ☐ **Change** to "clicked" map point
- ☐ **Fixed** at 38,42,12.4 - 77,09,52.3

Show Position Rings

- ☐ Yes ☐ No

1 mile and 1/4 mile at the
Search Point

Show Search Area

- ☐ Yes ☐ No

Search distance miles
radius

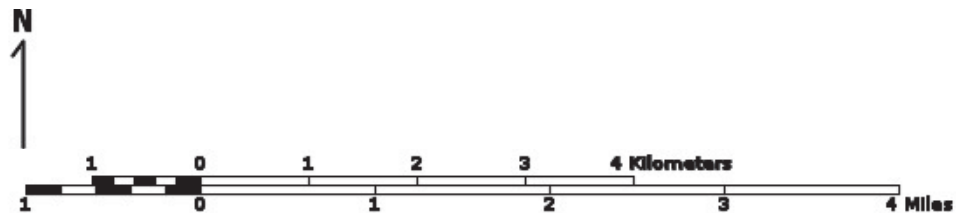
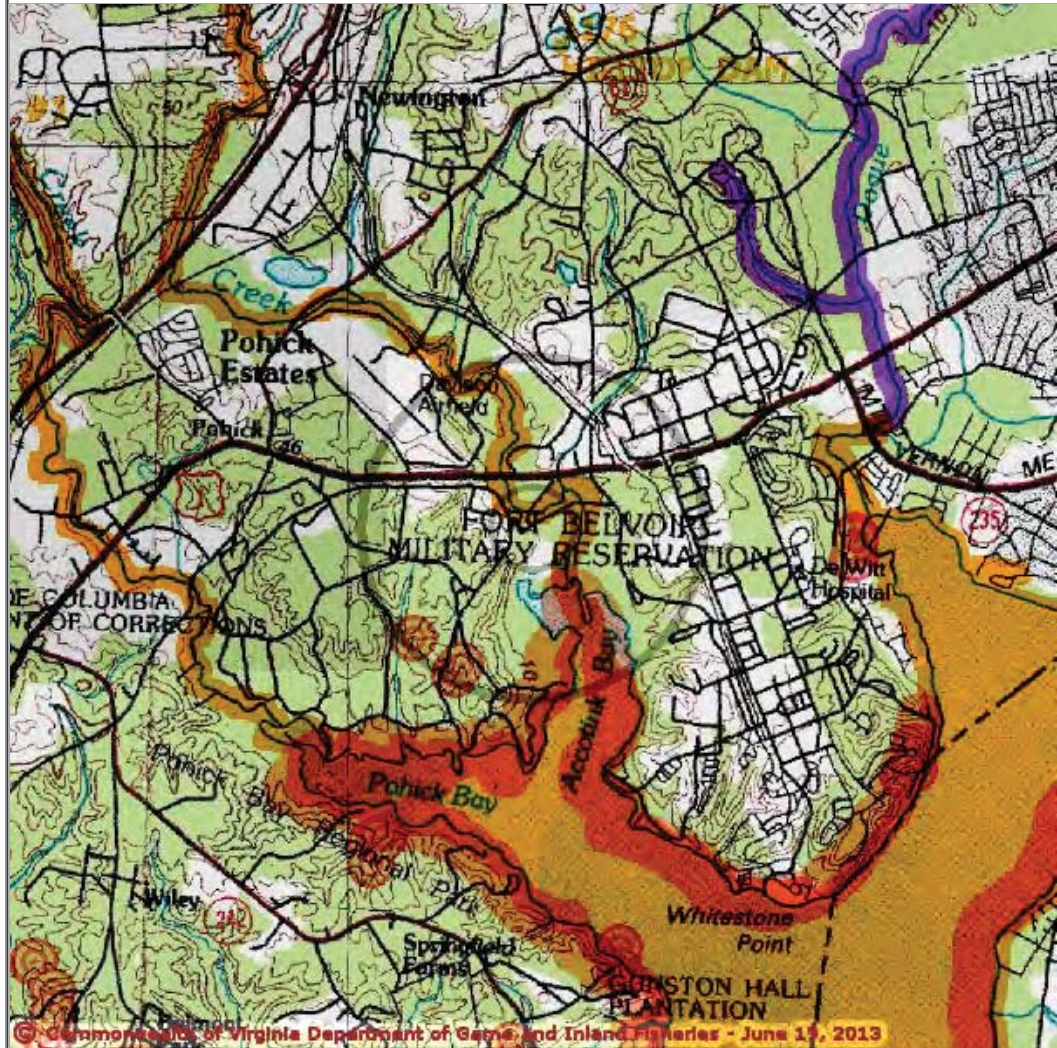
Search Point is at
map center

Base Map [Choices](#)

Map Overlay [Choices](#)

Current List: Anadromous,
TEWaters, BAEANests,
BECAR, Position

Map Overlay Legend



Point of Search 38,42,12.4 -77,09,52.3

Map Location 38,42,12.4 -77,09,52.3

Select **Coordinate System**: ☐ Degrees,Minutes,Seconds Latitude - Longitude

☐ Decimal Degrees Latitude - Longitude

☐ Meters UTM NAD83 East North Zone

☐ Meters UTM NAD27 East North Zone

Base Map source: USGS 1:100,000 topographic maps (see [Microsoft terraserver-usa.com](http://Microsoft.terraserver-usa.com) for

T & E Waters

Federal

State

Anadromous Fish Reach

Confirmed

Potential



Impediment



Position Rings
1 mile and 1/4
mile at the
Search Point

Bald Eagle
Concentration Areas
and Roosts



Bald Eagle nests
660 and 330 foot
management zones

details)

Map projection is UTM Zone 18 NAD 1983 with left 306981 and top 4290894. Pixel size is 16 meters . Coordinates displayed are Degrees, Minutes, Seconds North and West. Map is currently displayed as 600 columns by 600 rows for a total of 360000 pixels. The map display represents 9600 meters east to west by 9600 meters north to south for a total of 92.1 square kilometers. The map display represents 31501 feet east to west by 31501 feet north to south for a total of 35.5 square miles.

Topographic maps and Black and white aerial photography for year 1990+- are from the United States Department of the Interior, United States Geological Survey. Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network. Shaded topographic maps are from TOPO! ©2006 National Geographic <http://www.national.geographic.com/topo> All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.

map assembled 2013-06-19 12:25:21 (qa/qc December 5, 2012 8:04 - tn=467183
dist=4828.032 Visitor)
\$poi=38.7629477 -77.1793494

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Virginia Department of Game

Fish and Wildlife Information Service

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VaFWIS Search Report Compiled on 6/19/2013, 12:32:18 PM

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Known or likely to occur within a 3 mile radius around point 38,42,12.4 -77,09,52.3
in 059 Fairfax County, VA

[View Map of Site Location](#)

571 Known or Likely Species ordered by Status Concern for Conservation
(displaying first 28) (28 species with Status* or Tier I** or Tier II**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name
010032	FESE	II	Sturgeon, Atlantic	Acipenser oxyrinchus
060006	SE	II	Floater, brook	Alasmidonta varicosa
030062	ST	I	Turtle, wood	Glyptemys insculpta
040129	ST	I	Sandpiper, upland	Bartramia longicauda
040293	ST	I	Shrike, loggerhead	Lanius ludovicianus
040379	ST	I	Sparrow, Henslow's	Ammodramus henslowii

100155	FSST	I	Skipper, Appalachian grizzled	Pyrgus wyandot
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans
070027	FS	I	Amphipod, Northern Virginia well	Stygobromus phreaticus
100248	FS	I	Fritillary, regal	Speyeria idalia idalia
040093	FS	II	Eagle, bald	Haliaeetus leucocephalus
100154	FS	II	Butterfly, Persius duskywing	Erynnis persius persius
060029	FS	III	Lance, yellow	Elliptio lanceolata
030063	CC	III	Turtle, spotted	Clemmys guttata
030012	CC	IV	Rattlesnake, timber	Crotalus horridus
010077		I	Shiner, bridge	Notropis bifrenatus
040372		I	Crossbill, red	Loxia curvirostra
040225		I	Sapsucker, yellow-bellied	Sphyrapicus varius
040319		I	Warbler, black-throated green	Dendroica virens
040306		I	Warbler, golden-winged	Vermivora chrysoptera
040038		II	Bittern, American	Botaurus lentiginosus
040052		II	Duck, American black	Anas rubripes
040029		II	Heron, little blue	Egretta caerulea caerulea
040213		II	Owl, northern saw-whet	Aegolius acadicus
040105		II	Rail, king	Rallus elegans
040320		II	Warbler, cerulean	Dendroica cerulea
040304		II	Warbler, Swainson's	Limnothlypis swainsonii
040266		II	Wren, winter	Troglodytes troglodytes

To view All 571 species [View 571](#)

* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

** I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Anadromous Fish Use Streams (4 records)

[View Map of All
Anadromous Fish Use Streams](#)

Stream ID	Stream Name	Reach Status	Anadromous Fish Species			View Map
			Different Species	Highest TE *	Highest Tier **	

C18	Dogue creek	Confirmed	4		IV	Yes
C2	Accotink creek	Confirmed	2		IV	Yes
C62	Pohick creek	Confirmed	3		IV	Yes
C64	Potomac river	Confirmed	6		IV	Yes

Impediments to Fish Passage (1 records)

[View Map of All Fish Impediments](#)

ID	Name	River	View Map
1176	HILLTOP DAM	TR-DOGUE CREEK	Yes

Threatened and Endangered Waters (2 Reaches)

[View Map of All Threatened and Endangered Waters](#)

Stream Name	T&E Waters Species						View Map
	Highest TE [*]	BOVA Code, Status [*] , Tier ^{**} , Common & Scientific Name					
Dogue Creek (02070010)	ST	030062	ST	I	Turtle. wood	Glyptemys insculpta	Yes
Unnamed trib. of Dogue Creek (02070010)	ST	030062	ST	I	Turtle. wood	Glyptemys insculpta	Yes

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

are present. [View Map of Bald Eagle Concentration Areas and Roosts](#)

(6 records)

BECAR ID	Observation Year	Authority	Type	Comments	View Map
53	2006 - 2007	VDGIF, Center for Conservation Biology	Summer Concentration Area	Eagle_use High	Yes
54	2006 - 2007	VDGIF, Center for Conservation Biology	Summer Concentration Area	Eagle_use Low	Yes
55	2006 - 2007	VDGIF, Center for Conservation Biology	Summer Concentration Area	Eagle_use Moderate	Yes
56	2006 - 2007	VDGIF, Center for Conservation Biology	Winter Concentration Area	Eagle_use High	Yes

57	2006 - 2007	VDGIF, Center for Conservation Biology	Winter Concentration Area	Eagle_use Low	Yes
58	2006 - 2007	VDGIF, Center for Conservation Biology	Winter Concentration Area	Eagle_use Moderate	Yes

Bald Eagle Nests (9 records , 9 Observations with Threatened or Endangered species)

[View Map of All Query Results
Bald Eagle Nests](#)

Nest	N Obs	Latest Date	N Species			View Map
			Different Species	Highest TE [*]	Highest Tier ^{**}	
FF0401	14	Apr 24 2011	1	FS	II	Yes
FF0501	13	Apr 24 2011	1	FS	II	Yes
FF0701	10	Apr 24 2011	1	FS	II	Yes
FF0801	8	Apr 24 2011	1	FS	II	Yes
FF0601	4	Apr 29 2007	1	FS	II	Yes
FF0402	4	May 3 2006	1	FS	II	Yes
FF0301	2	May 1 2003	1	FS	II	Yes
FF9202	18	Apr 27 2000	1	FS	II	Yes
FF9001	2	Jan 1 1991	1	FS	II	Yes

Displayed 9 Bald Eagle Nests

Habitat Predicted for Aquatic WAP Tier I & II Species (6 Reaches)

[View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species](#)

Stream Name	Tier Species						View Map
	Highest TE [*]	BOVA Code, Status [*] , Tier ^{**} , Common & Scientific Name					
Accotink Creek (20700102)		010077		I	Shiner, bridle	Notropis bifrenatus	Yes
(20700102)	ST	030062	ST	I	Turtle, wood	Glyptemys insculpta	Yes
Accotink Creek (20700102)	ST	030062	ST	I	Turtle, wood	Glyptemys insculpta	Yes

Dogue Creek (20700102)	ST	030062	ST	I	Turtle, wood	Glyptemys insculpta	Yes
South Run (20700102)	ST	030062	ST	I	Turtle, wood	Glyptemys insculpta	Yes
Unnamed trib. of Dogue Creek (20700102)	ST	030062	ST	I	Turtle, wood	Glyptemys insculpta	Yes

Habitat Predicted for Terrestrial WAP Tier I & II Species (3 Species)

[View Map of Combined Terrestrial Habitat Predicted for 3 WAP Tier I & II Species Listed Below](#)

ordered by Status Concern for Conservation

BOVA Code	Status*	Tier**	Common Name	Scientific Name	View Map
040093	FS	II	Eagle, bald	Haliaeetus leucocephalus	Yes
040038		II	Bittern, American	Botaurus lentiginosus	Yes
040105		II	Rail, king	Rallus elegans	Yes

Virginia Breeding Bird Atlas Blocks (6 records)

[View Map of All Query Results](#)
[Virginia Breeding Bird Atlas Blocks](#)

BBA ID	Atlas Quadrangle Block Name	Breeding Bird Atlas Species			View Map
		Different Species	Highest TE*	Highest Tier**	
53184	Fort Belvoir, CE	85	FS	II	Yes
53183	Fort Belvoir, CW	37	FS	II	Yes
53182	Fort Belvoir, NE	71		III	Yes
53181	Fort Belvoir, NW	43		IV	Yes
53186	Fort Belvoir, SE	72	FS	II	Yes
54181	Mount Vernon, NW	57		IV	Yes

Public Holdings: (4 names)

Name	Agency	Level
Fort Belvoir Military Reservation	U.S. Dept. of Army	Federal
Jackson Mile Abbott Wetland Refuge	U.S. Dept. of Army	Federal
George Washington Grist Mill State Park	VA Dept. of Conservation and Recreation	State

Summary of BOVA Species Associated with Cities and Counties of the Commonwealth of Virginia:

FIPS Code	City and County Name	Different Species	Highest TE	Highest Tier
059	Fairfax	559	FESE	I

USGS 7.5' Quadrangles:

Fort Belvoir

Mount Vernon

USGS NRCS Watersheds in Virginia:

N/A

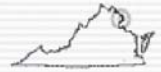
USGS National 6th Order Watersheds Summary of Wildlife Action Plan Tier I, II, III, and IV Species:

HU6 Code	USGS 6th Order Hydrologic Unit	Different Species	Highest TE	Highest Tier
PL27	Dogue Creek	72	FSST	I
PL28	Potomac River-Little Hunting Creek	68	FSST	I
PL29	Pohick Creek	70	FSST	I
PL30	Accotink Creek	72	FSST	I
PL48	Occoquan River-Belmont Bay	70	FSST	I
PL50	Potomac River-Occoquan Bay	71	FSST	I

Compiled on 6/19/2013, 12:32:20 PM V467183.0 report=V searchType= R dist= 4828.032 poi= 38,42,12.4 -77,09,52.3

Wednesday, June 19, 2013 12:32:21 PM | [DGIF](#) | [Credits](#) | [Disclaimer](#) | Please view our [privacy policy](#) |
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38,42,12.4 -77,09,52.3

is the Search Point

Search Point

- ☐ **Change** to "clicked" map point
- ☐ **Fixed** at 38,45,11.1 - 77,12,05.6

Show Position Rings

- ☐ Yes ☐ No

1 mile and 1/4 mile at the
Search Point

Show Search Area

- ☐ Yes ☐ No

Search distance miles
radius

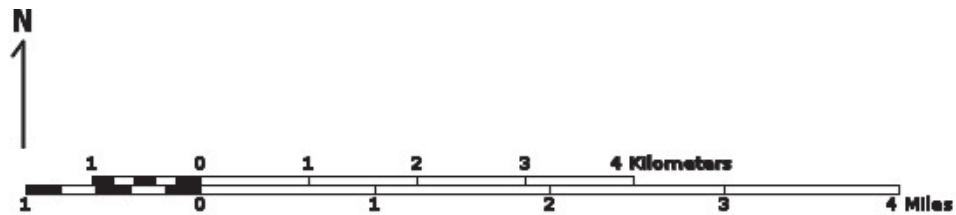
Search Point is at
map center

Base Map [Choices](#)

Map Overlay [Choices](#)

Current List: Anadromous,
TEWaters, BAEANests,
BECAR, Position

Map Overlay Legend



Point of Search 38,45,11.1 -77,12,05.6

Map Location 38,45,11.1 -77,12,05.6

Select **Coordinate System**: ☐ Degrees,Minutes,Seconds Latitude - Longitude

☐ Decimal Degrees Latitude - Longitude

☐ Meters UTM NAD83 East North Zone

☐ Meters UTM NAD27 East North Zone

Base Map source: USGS 1:100,000 topographic maps (see [Microsoft terraserver-usa.com](http://Microsoft.terraserver-usa.com) for

T & E Waters

Federal

State

Anadromous Fish Reach

Confirmed

Potential

Impediment

Position Rings
1 mile and 1/4
mile at the
Search Point

Bald Eagle
Concentration Areas
and Roosts

Bald Eagle nests
660 and 330 foot
management zones

details)

Map projection is UTM Zone 18 NAD 1983 with left 303893 and top 4296478. Pixel size is 16 meters . Coordinates displayed are Degrees, Minutes, Seconds North and West. Map is currently displayed as 600 columns by 600 rows for a total of 360000 pixels. The map display represents 9600 meters east to west by 9600 meters north to south for a total of 92.1 square kilometers. The map display represents 31501 feet east to west by 31501 feet north to south for a total of 35.5 square miles.

Topographic maps and Black and white aerial photography for year 1990+- are from the United States Department of the Interior, United States Geological Survey. Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network. Shaded topographic maps are from TOPO! ©2006 National Geographic <http://www.national.geographic.com/topo> All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.

map assembled 2013-06-19 12:35:07 (qa/qc December 5, 2012 8:04 - tn=467186
dist=4828.032 Visitor)
\$poi=38.7638468 -77.2069121

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VaFWIS Search Report Compiled on 6/19/2013, 12:42:51 PM

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Observations reported or potential habitat occurs within a 3 mile radius around point 38,45,11.1 - 77,12,05.6
in 059 Fairfax County, VA

[View Map of Site Location](#)

569 Known or Likely Species ordered by Status Concern for Conservation
(displaying first 28) (28 species with Status* or Tier I** or Tier II**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name
010032	FESE	II	Sturgeon, Atlantic	Acipenser oxyrinchus
060006	SE	II	Floater, brook	Alasmidonta varicosa
030062	ST	I	Turtle, wood	Glyptemys insculpta
040129	ST	I	Sandpiper, upland	Bartramia longicauda
040293	ST	I	Shrike, loggerhead	Lanius ludovicianus

040379	ST	I	Sparrow, Henslow's	Ammodramus henslowii
100155	FSST	I	Skipper, Appalachian grizzled	Pyrgus wyandot
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans
070027	FS	I	Amphipod, Northern Virginia well	Stygobromus phreaticus
100248	FS	I	Fritillary, regal	Speyeria idalia idalia
040093	FS	II	Eagle, bald	Haliaeetus leucocephalus
100154	FS	II	Butterfly, Persius duskywing	Erynnis persius persius
060029	FS	III	Lance, yellow	Elliptio lanceolata
030063	CC	III	Turtle, spotted	Clemmys guttata
030012	CC	IV	Rattlesnake, timber	Crotalus horridus
010077		I	Shiner, bridle	Notropis bifrenatus
040372		I	Crossbill, red	Loxia curvirostra
040225		I	Sapsucker, yellow-bellied	Sphyrapicus varius
040319		I	Warbler, black-throated green	Dendroica virens
040306		I	Warbler, golden-winged	Vermivora chrysoptera
040038		II	Bittern, American	Botaurus lentiginosus
040052		II	Duck, American black	Anas rubripes
040029		II	Heron, little blue	Egretta caerulea caerulea
040213		II	Owl, northern saw-whet	Aegolius acadicus
040105		II	Rail, king	Rallus elegans
040320		II	Warbler, cerulean	Dendroica cerulea
040304		II	Warbler, Swainson's	Limnothlypis swainsonii
040266		II	Wren, winter	Troglodytes troglodytes

To view All 569 species [View 569](#)

* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

** I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Anadromous Fish Use Streams (2 records)

[View Map of All
Anadromous Fish Use Streams](#)

Stream ID	Stream Name	Reach Status	Anadromous Fish Species			View Map
			Different	Highest *	Highest **	

			Species	TE	Tier	
C2	Accotink creek	Confirmed	2		IV	Yes
C62	Pohick creek	Confirmed	3		IV	Yes

Impediments to Fish Passage (2 records)

View Map of All Fish Impediments

ID	Name	River	View Map
1159	ACCOTINK DAM	ACCOTINK CREEK	Yes
1176	HILLTOP DAM	TR-DOGUE CREEK	Yes

Threatened and Endangered Waters

N/A

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests

N/A

Habitat Predicted for Aquatic WAP Tier I & II Species (4 Reaches)

View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species

Stream Name	Tier Species						View Map
	Highest TE [*]	BOVA Code, Status [*] , Tier ^{**} , Common & Scientific Name					
Accotink Creek (20700102)		010077		I	Shiner, bridge	Notropis bifrenatus	Yes
(20700102)	ST	030062	ST	I	Turtle, wood	Glyptemys insculpta	Yes
Rocky Branch (20700102)	ST	030062	ST	I	Turtle, wood	Glyptemys insculpta	Yes

South Run (20700102)	ST	030062	ST	I	Turtle. wood	Glyptemys insculpta	Yes
----------------------	----	--------	----	---	------------------------------	---------------------	---------------------

Habitat Predicted for Terrestrial WAP Tier I & II Species

N/A

Virginia Breeding Bird Atlas Blocks (8 records)

[View Map of All Query Results
Virginia Breeding Bird Atlas Blocks](#)

BBA ID	Atlas Quadrangle Block Name	Breeding Bird Atlas Species			View Map
		Different Species	Highest TE [*]	Highest Tier ^{**}	
53194	Annandale, CE	49		IV	Yes
53193	Annandale, CW	72		II	Yes
53196	Annandale, SE	73		IV	Yes
53195	Annandale, SW	47		IV	Yes
52196	Fairfax, SE	69		II	Yes
53182	Fort Belvoir, NE	71		III	Yes
53181	Fort Belvoir, NW	43		IV	Yes
52182	Occoquan, NE	59		IV	Yes

Public Holdings: (1 names)

Name	Agency	Level
Fort Belvoir Military Reservation	U.S. Dept. of Army	Federal

Summary of BOVA Species Associated with Cities and Counties of the Commonwealth of Virginia:

FIPS Code	City and County Name	Different Species	Highest TE	Highest Tier
059	Fairfax	559	FESE	I

USGS 7.5' Quadrangles:

Occoquan

Fairfax

Fort Belvoir

Annandale

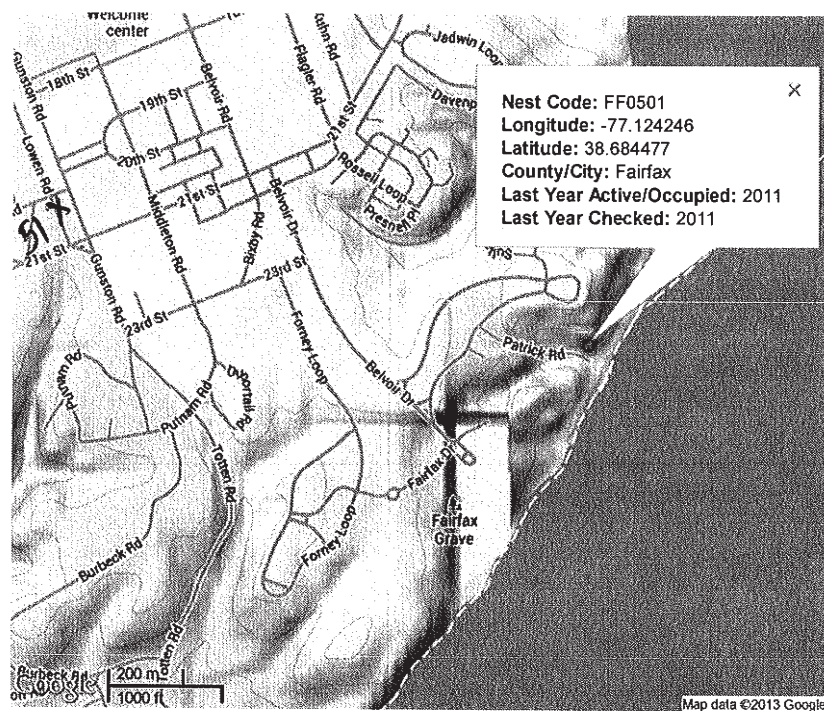
USGS NRCS Watersheds in Virginia:

N/A

USGS National 6th Order Watersheds Summary of Wildlife Action Plan Tier I, II, III, and IV Species:

HU6 Code	USGS 6th Order Hydrologic Unit	Different Species	Highest TE	Highest Tier
PL26	Cameron Run	68	FSST	I
PL27	Dogue Creek	72	FSST	I
PL29	Pohick Creek	70	FSST	I
PL30	Accotink Creek	72	FSST	I

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Help CCB by Reporting Eagle Nest Locations

Despite our best efforts, an unknown number of eagle nests go unrecorded each year. This is particularly true in the Piedmont and mountains of Virginia where the survey does not cover. We believe that the public knows of many nests that are unknown to us. All active or recently active nests known to CCB (surveyed in last year's Annual Bald Eagle Survey plus reported with confirmed location) are presented in the eagle nest locator. Please view nests in your local area and report nests known to you that do not appear. Visit our Report a Nest page for instructions. Thanks for your help!

Annual Survey

The data contained in the VaEagles Nest Locator comes directly from Virginia's annual bald eagle survey. Breeding eagles have been surveyed annually in the lower Chesapeake Bay since 1956. The 2012 survey represents the 57th consecutive survey. Each year CCB biologists fly a nest survey in February and March to map eagle nests and to determine their activity status. This survey is followed in late April and May by a productivity survey where chicks are counted in each nest. The survey covers all tributaries of the lower Chesapeake, as well as, other prominent bodies of water and requires more than 100 hours of flight time in a high-wing Cessna. Biologists survey all known nest structures to determine their activity status and search for newly established nests. During the 2011 breeding season, CCB surveyed more than 1000 nest structures and documented more than 730 breeding pairs that produced more than 980 chicks.

Regulatory Contacts

Bald Eagles are sensitive to human disturbance. Since the 1970s nest sites have been managed using a combination of spatial buffers and time-of-year restrictions. Human activities that are considered to be detrimental to breeding pairs (e.g. residential, commercial, and industrial

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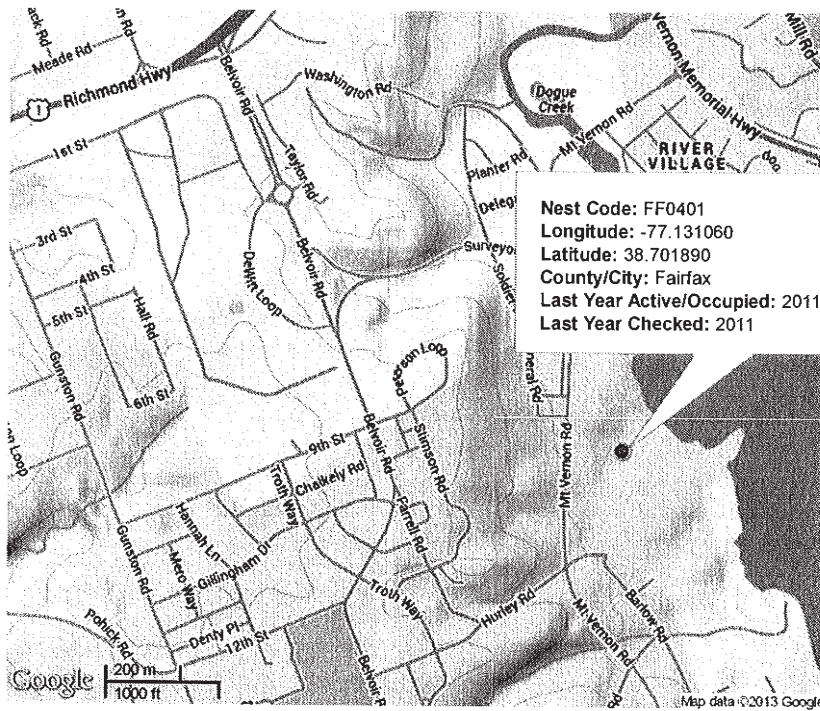
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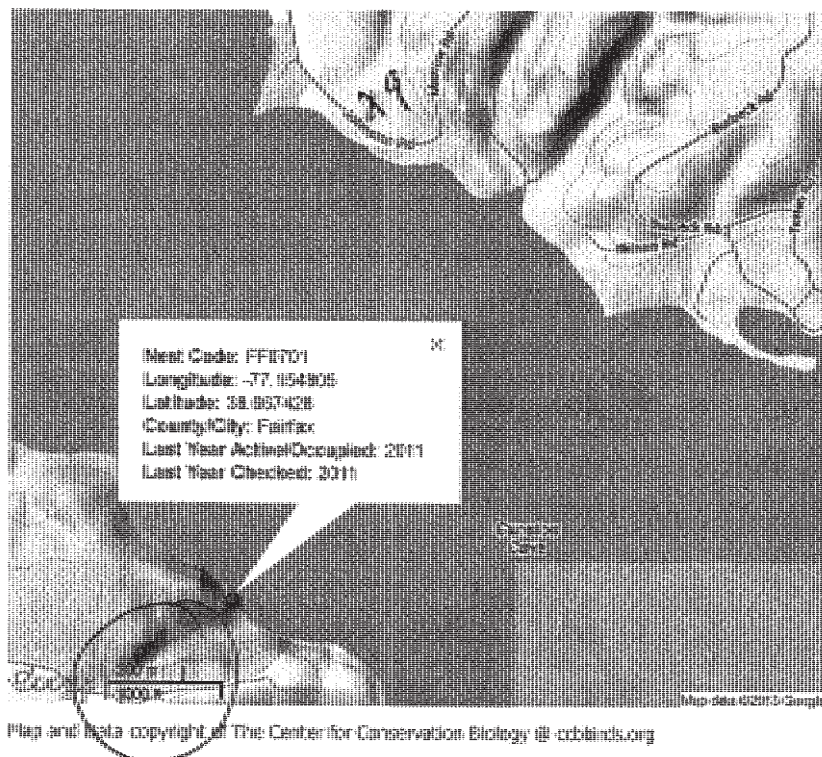
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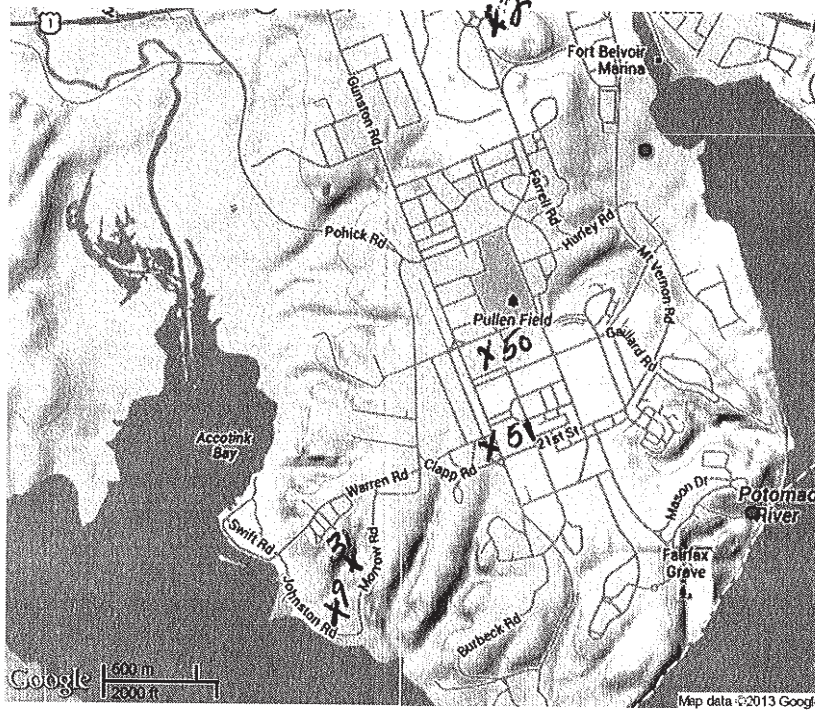
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development, logging, use of toxic chemicals) are restricted within a "primary buffer" and human activities that are considered to impact the integrity of the primary buffer (e.g. construction of high-density developments, multi-story buildings, new roadways) are restricted within a "secondary buffer". Time-of-year restrictions are used to limit direct human activities (e.g. recreational activities, logging, mineral exploration, low-level aircraft operations) within buffer areas that may disturb eagles during sensitive periods of the nesting cycle.

The Virginia Department of Game and Inland Fisheries (VDGIF) has legal jurisdiction over issues relating to bald eagle protection. The VDGIF, through its environmental services section, reviews proposed projects from government agencies and private individuals to identify possible impacts. Such reviews are encouraged and usually result in a considerable savings in time and money to the landowner. The two agencies listed here are the lead agencies for bald eagle reviews and recommendations in Virginia.

Virginia Department of Game and Inland Fisheries

P.O. Box 11104
Richmond, Virginia 23230-1104
(804) 367-8999

U. S. Fish and Wildlife Service

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Janet O'Neill

From: janet1118 <janet1118@verizon.net>
Sent: Tuesday, February 25, 2014 9:01 PM
To: Janet O'Neill
Subject: Fwd: RE: Fort Belvoir Real Property Master Plan - Project Review Request

Sent from my Verizon Wireless 4G LTE Smartphone

----- Original message -----

From: Troy Andersen
Date: 02/24/2014 9:41 AM (GMT-05:00)
To: Janet O'Neill
Cc: Sarah Nystrom
Subject: RE: Fort Belvoir Real Property Master Plan - Project Review Request

Ma'am:

I wanted to close the loop on this project with a few comments.

We have reviewed the project package received on October 21, 2013 for the referenced project. The following comments are provided under provisions of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended, and Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c, 54 Stat. 250) as amended.

We concur with the determinations provided in the revised Species Conclusion Table dated November 27, 2013. As one of the project areas does intersect with an eagle concentration area, please work with Sarah Nystrom (cc'd above) to ensure that the particular projects in this area are planned in a manner that minimizes potential impacts to bald eagles.

Should project plans change or if additional information on the distribution of listed species or critical habitat becomes available, this determination may be reconsidered. If you have any questions, please contact me.

V/R
Troy

Troy M. Andersen

Endangered Species/Conservation Planning Assistance Supervisor

USFWS – Virginia Field Office

Phone: 804-693-6694 Ext. 166

Mobile: 804-654-9235

Visit us at: <http://www.fws.gov/northeast/virginiafield/>

From: JanetO'Neill [mailto:janet1118@verizon.net]

Sent: Monday, October 21, 2013 12:07 PM

To: troy_andersen@fws.gov

Cc: Penny.Douglas@aecom.com

Subject: Fort Belvoir Real Property Master Plan - Project Review Request

Carter's Run Environmental Corporation

Dear Mr. Andersen,

Attached is a PDF binder for a Project Review for the subject project. The United States (U.S.) Army Garrison Fort Belvoir is in the process of developing a new RPMP for Fort Belvoir's Main Post and the Fort Belvoir North Area. They are also preparing an EIS to address adoption of the RPMP and implementation of the plan's proposed short-term (2012 – 2017) development projects. These include 52 site development and seven transportation improvement projects. The EIS will also, to the extent that we have information, address ten long-term (2018 – 2030) development and ten long-term transportation improvement projects.

I am also sending a hard copy of the attached materials via regular mail. Please note, the letter from the VDCR-DNH attached separately was password protected and would not combine into the PDF binder.

If you have any questions, please call me at 540-219-0322.

Janet O'Neill

Carter's Run Environmental Corporation

7137 Wilson Road, Marshall, VA 20115
540-219-0322

540-349-3263

Janet1118@verizon.net



Doug Domenech
Secretary of Natural Resources

COMMONWEALTH of VIRGINIA
Department of Game and Inland Fisheries

Robert W. Duncan
Director

July 30, 2013

Janet C. O'Neill
Carter's Run Environmental Corporation

via email: janet1118@verizon.net

Re: Fort Belvoir Real Property Master Plan

Dear Ms. O'Neill,

We appreciate your interest in submitting your project(s) for review by VDGIF to ensure the protection of sensitive wildlife resources during project development. Unfortunately, due to staffing limitations, we are unable to review pre-applications or scoping documents submitted to our Department. Please note that lack of a response from VDGIF does not constitute a "no comment" response, nor does it imply support of the project or associated activities. It simply means that VDGIF is unable to review your pre-application submittal.

To review your project site for the location of wildlife resources under our jurisdiction, including threatened and endangered wildlife, we recommend accessing the Virginia Fish and Wildlife Information System (VAFWIS) at <http://vafwis.org/fwis/>.

If you have further questions or need additional information about VDGIF's Environmental Programs, please visit: <http://www.dgif.virginia.gov/environmental-programs/>.

Please feel free to attach a copy of this correspondence to any applications or documents you may submit for your project to state or federal permitting agencies.

Sincerely,

A handwritten signature in black ink that reads "Angela G. Weller".

Angela G. Weller
Environmental Services Section

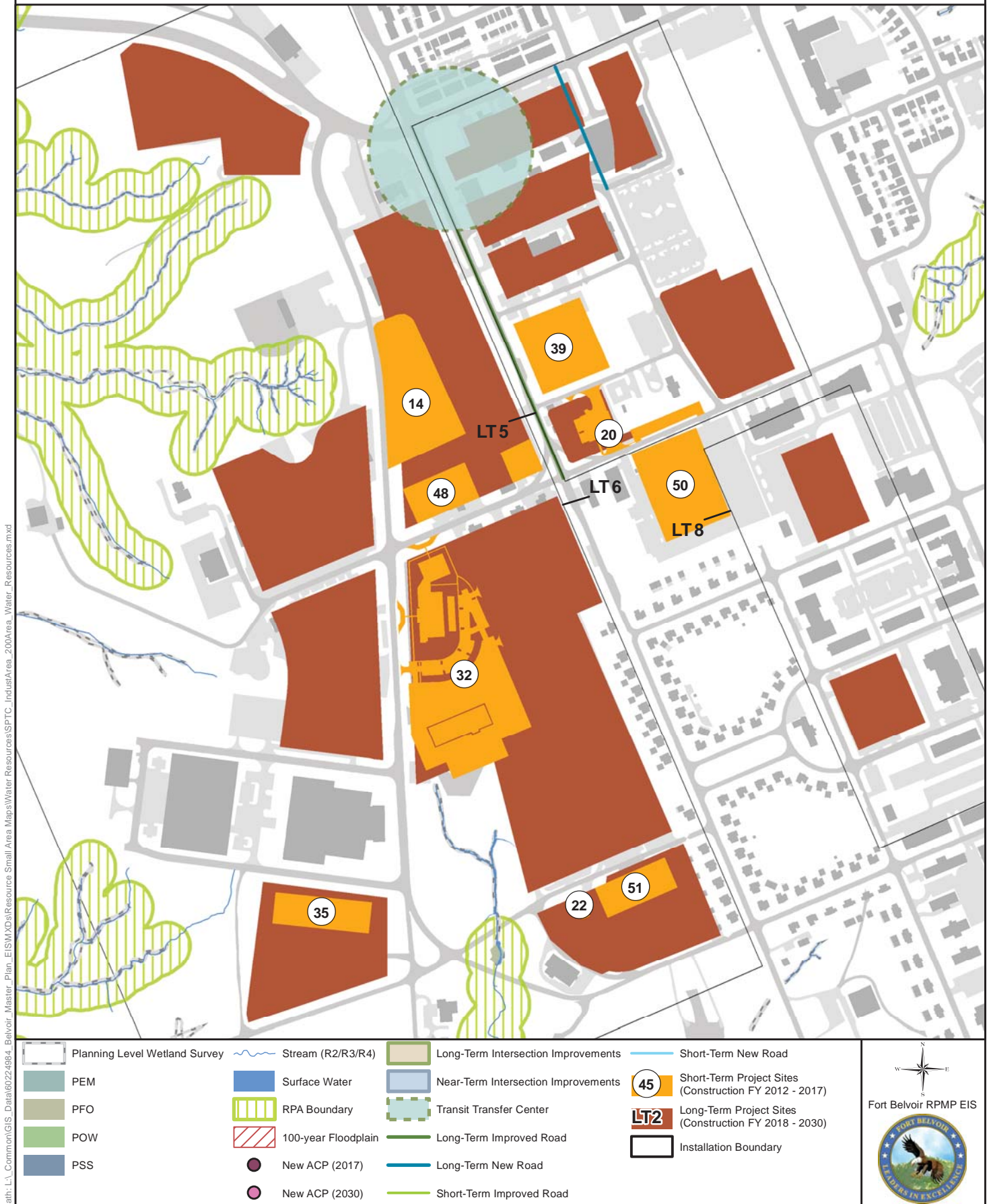
SMALL AREA MAPS

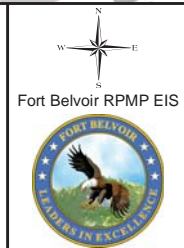
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WATER RESOURCES SMALL AREA MAPS

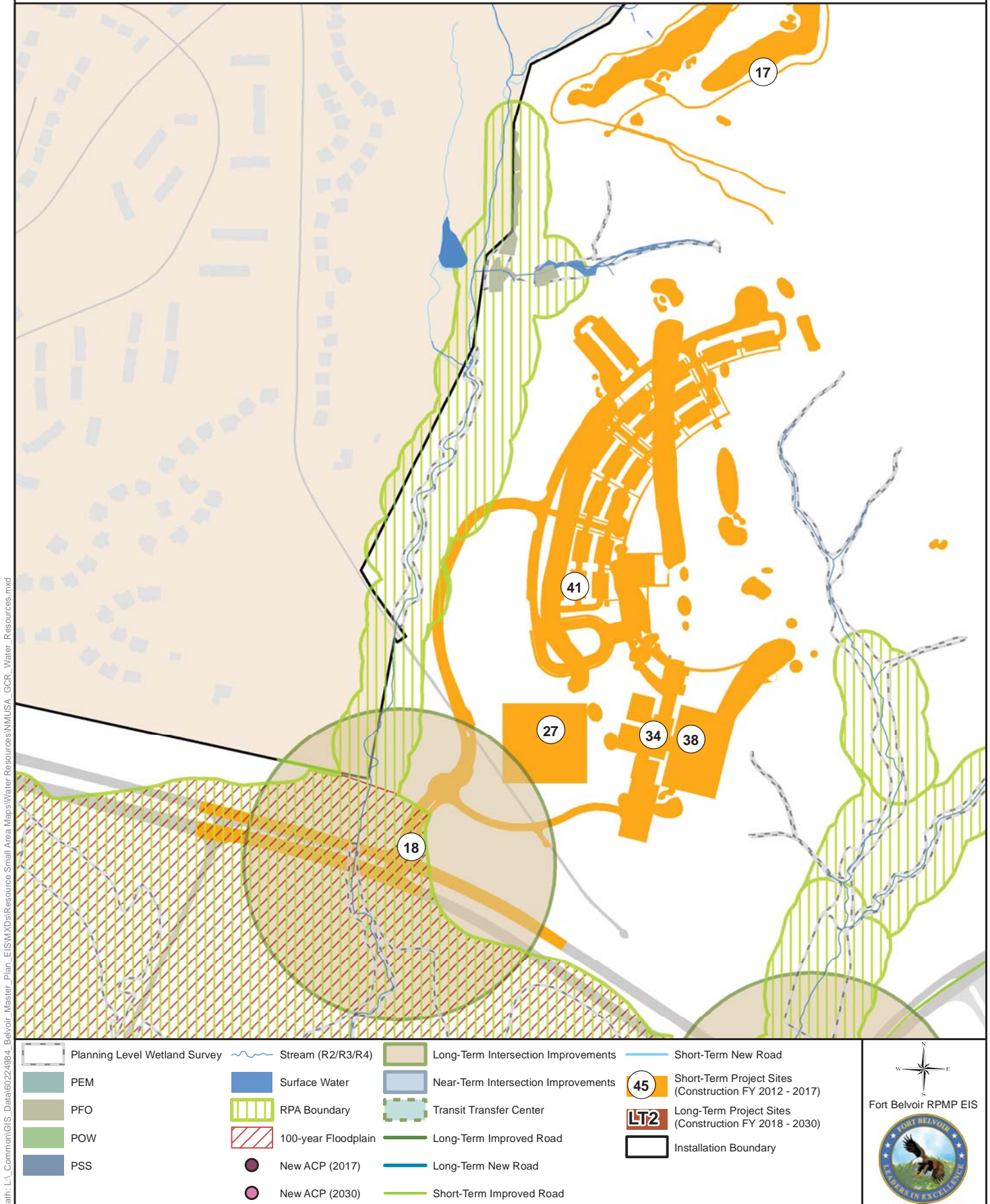
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Water and Associated Sensitive Resources - South Post Town Center, Industrial Area, 200 Area

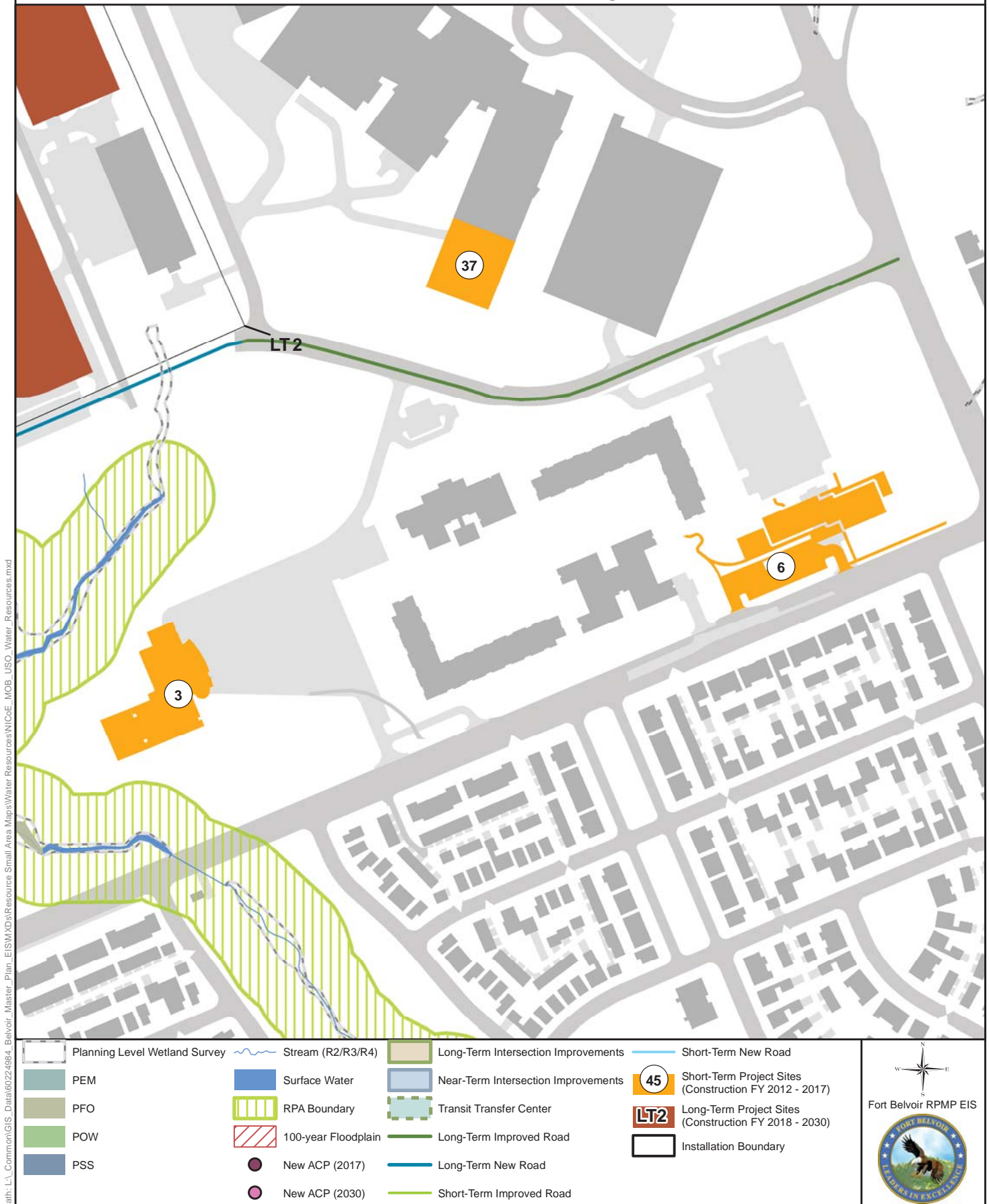




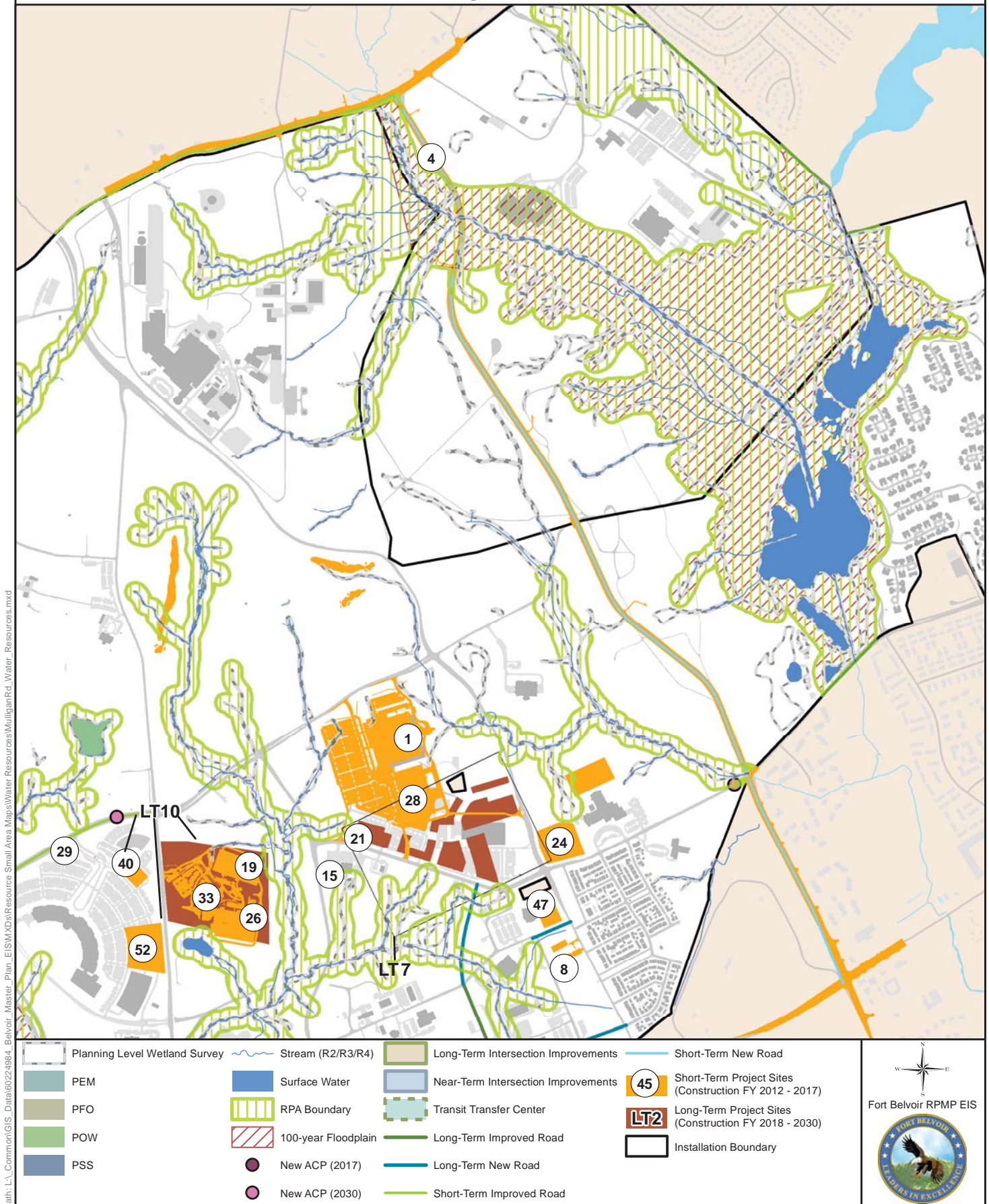
Water and Associated Sensitive Resources - NMUSA & Golf Course Reconfiguration



Water and Associated Sensitive Resources - NlCoE, Medical Office Building, USO

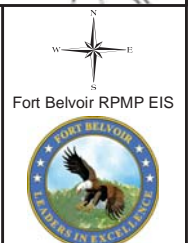
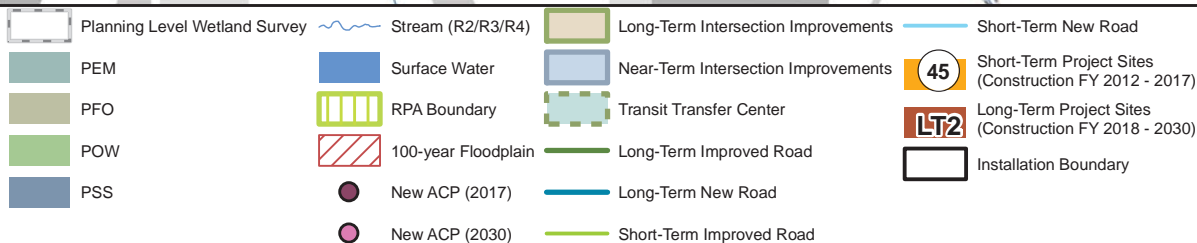
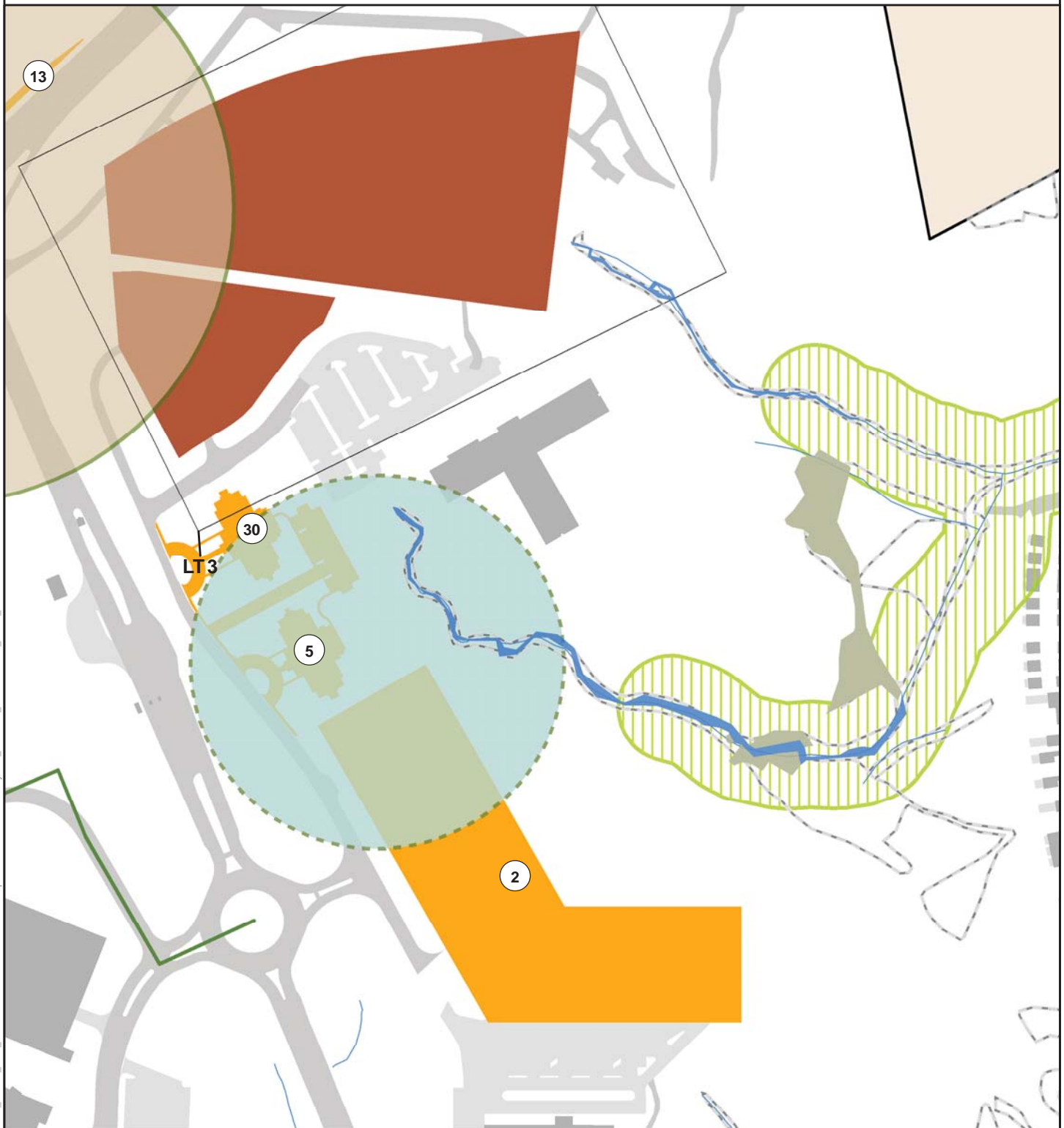


Water and Associated Sensitive Resources - Mulligan Road

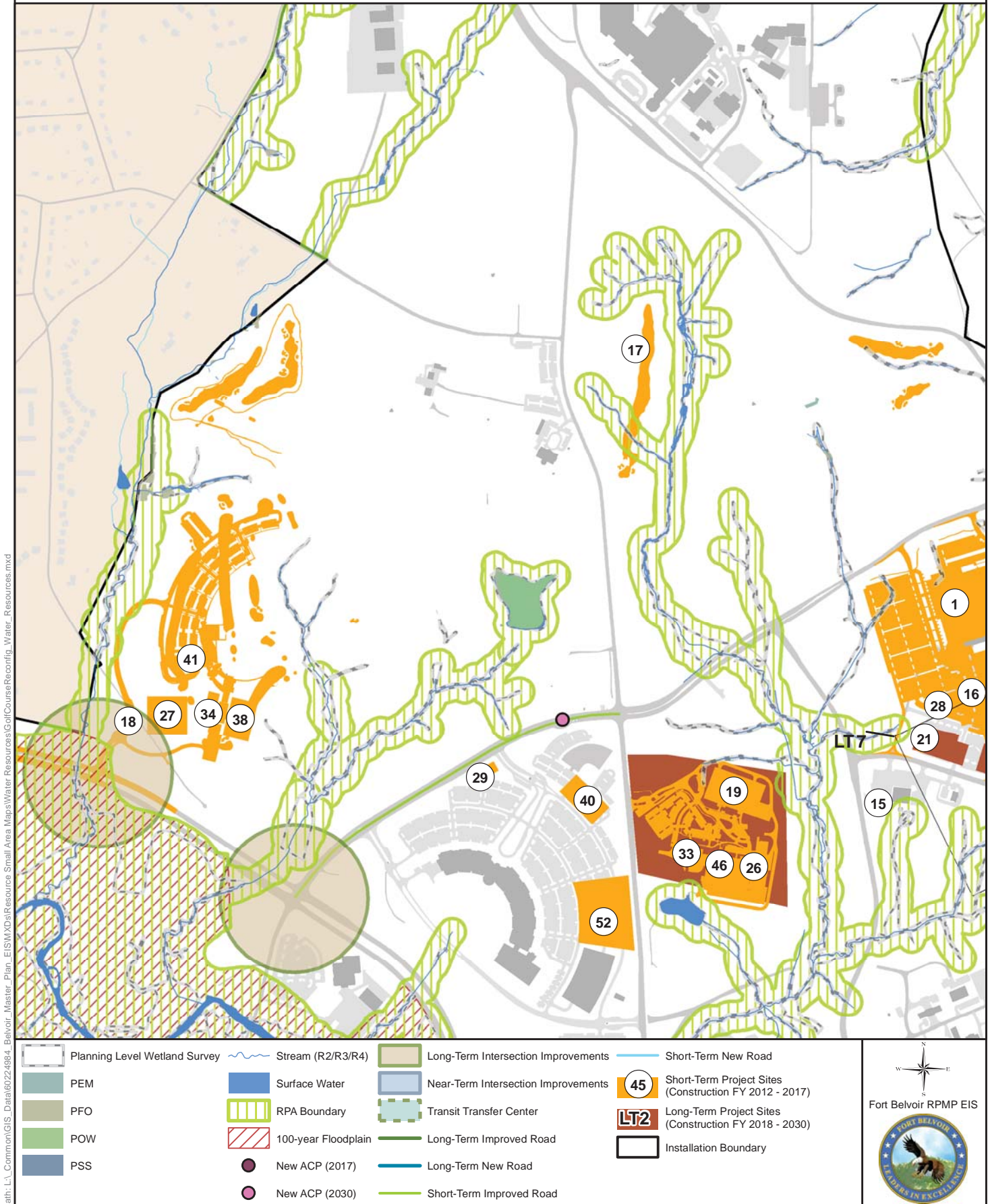


Water and Associated Sensitive Resources - Grays Hill, PAL East of Belvoir Rd, Fisher House 1 & 2

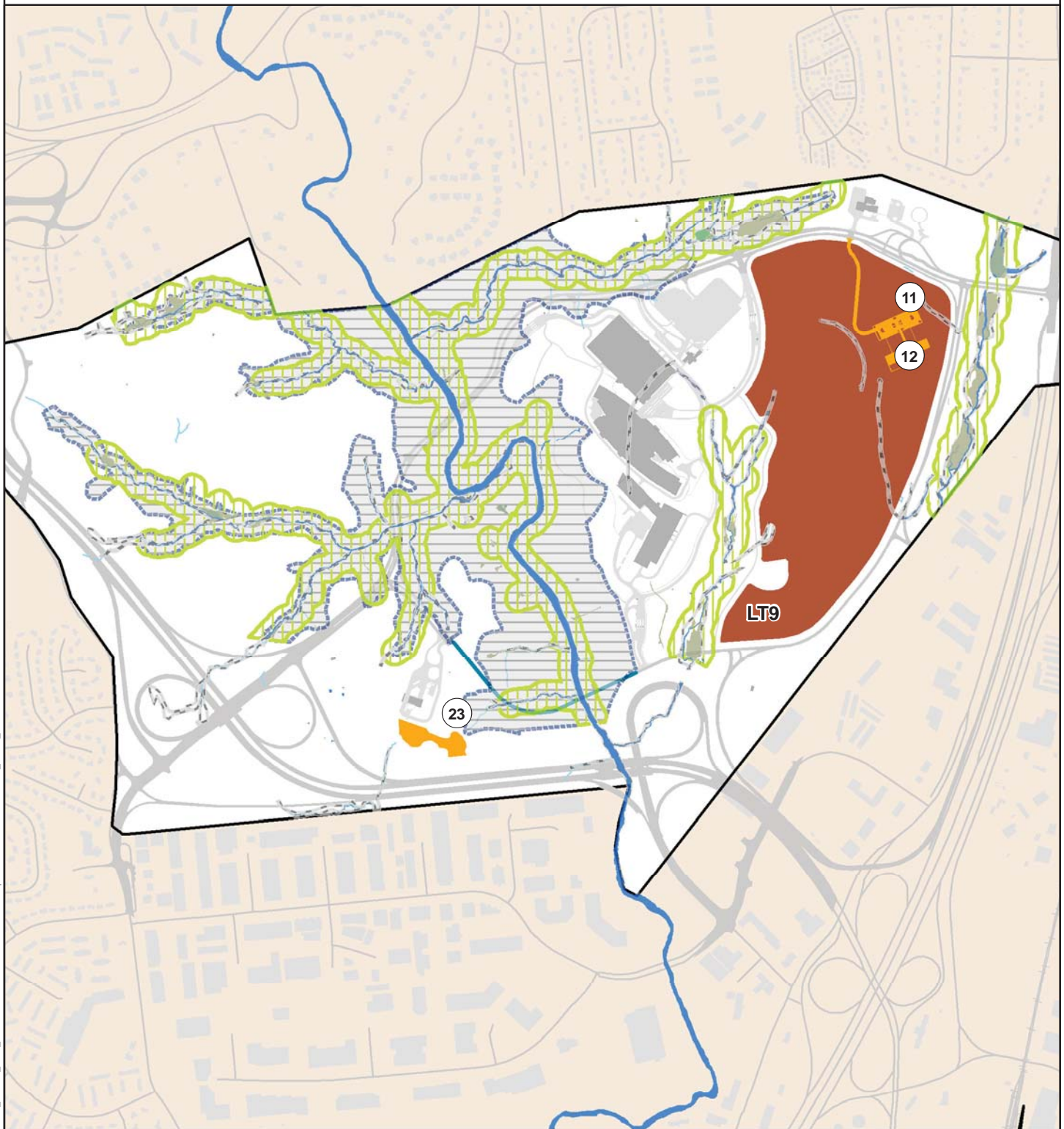
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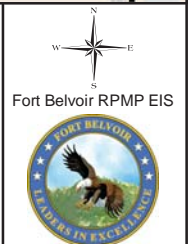
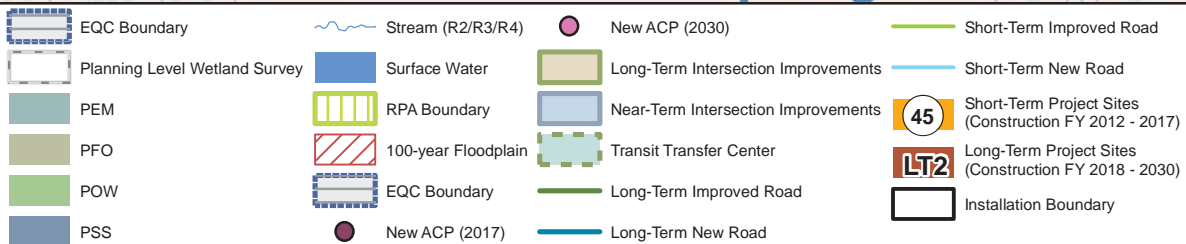
Water and Associated Sensitive Resources - Golf Course Reconfiguration



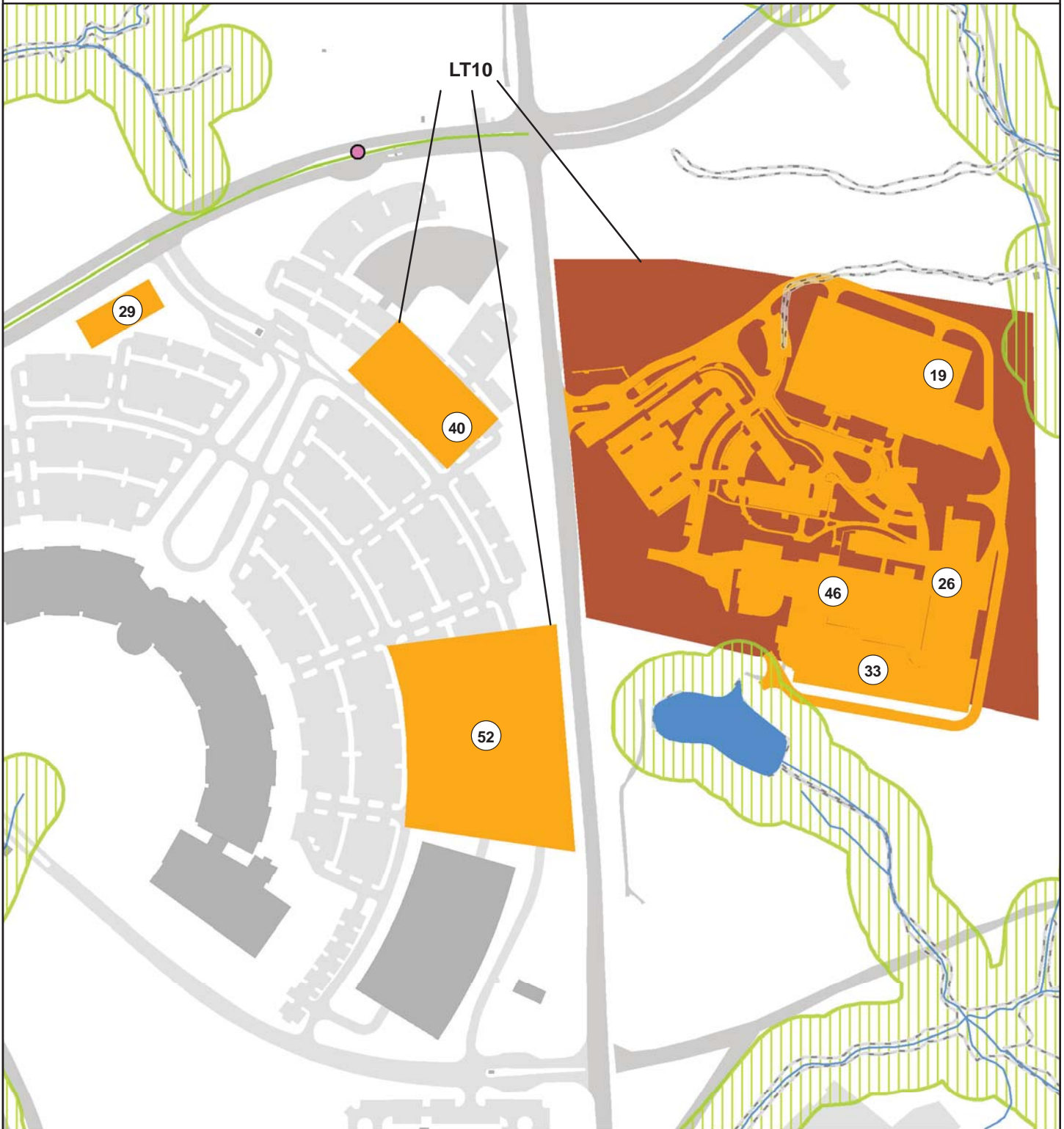
Water and Associated Sensitive Resources - Fort Belvoir North Area



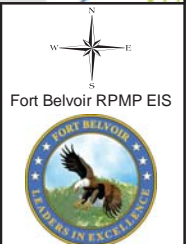
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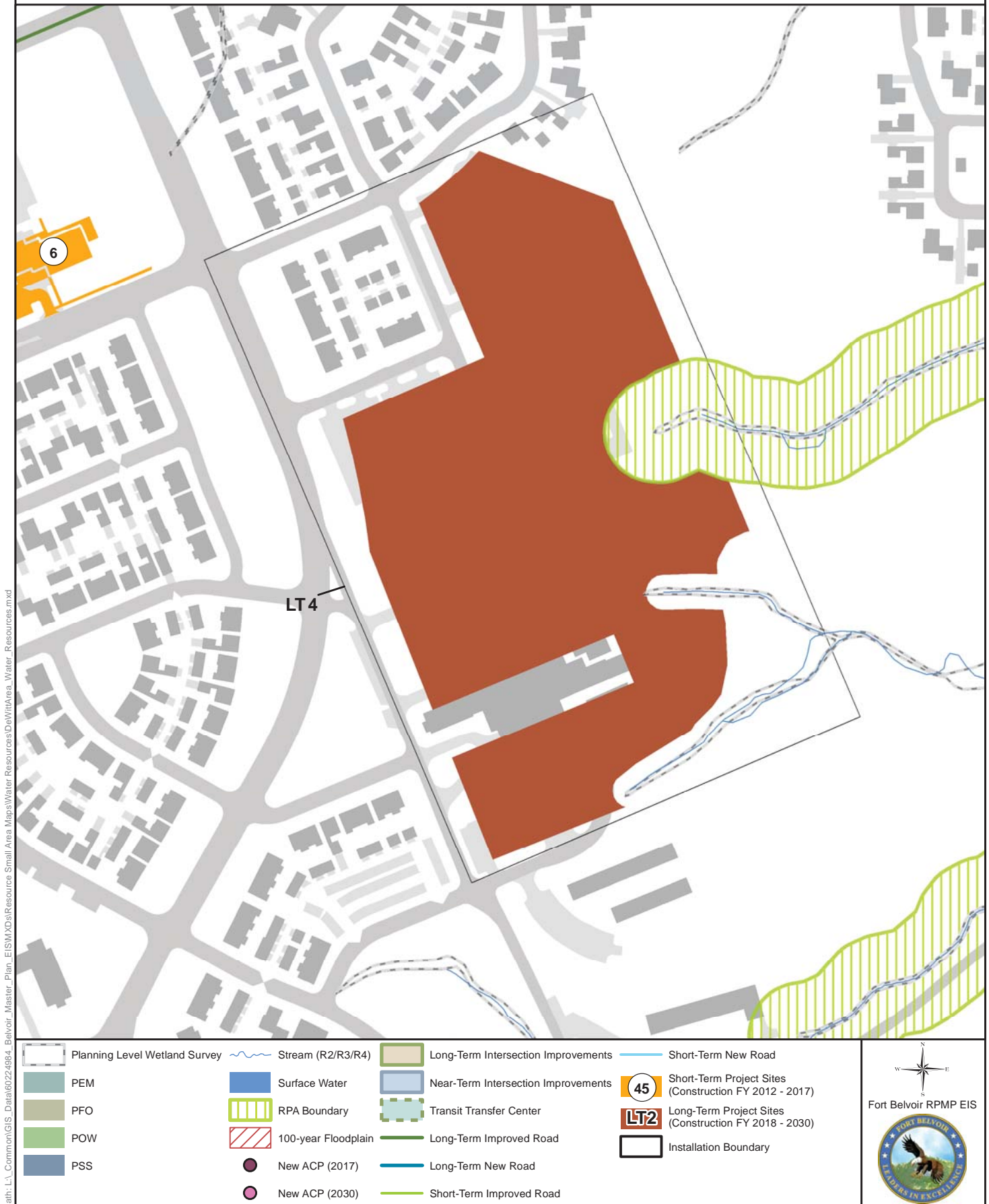
Water and Associated Sensitive Resources - DLA & INSCOM



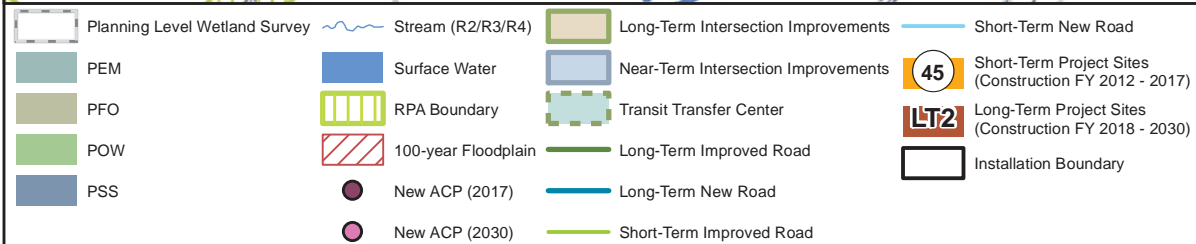
- | | | | |
|-------------------------------|---------------------|-------------------------------------|--|
| Planning Level Wetland Survey | Stream (R2/R3/R4) | Long-Term Intersection Improvements | Short-Term New Road |
| PEM | Surface Water | Near-Term Intersection Improvements | Short-Term Project Sites (Construction FY 2012 - 2017) |
| PFO | RPA Boundary | Transit Transfer Center | Long-Term Project Sites (Construction FY 2018 - 2030) |
| POW | 100-year Floodplain | Long-Term Improved Road | Installation Boundary |
| PSS | New ACP (2017) | Long-Term New Road | |
| | New ACP (2030) | Short-Term Improved Road | |



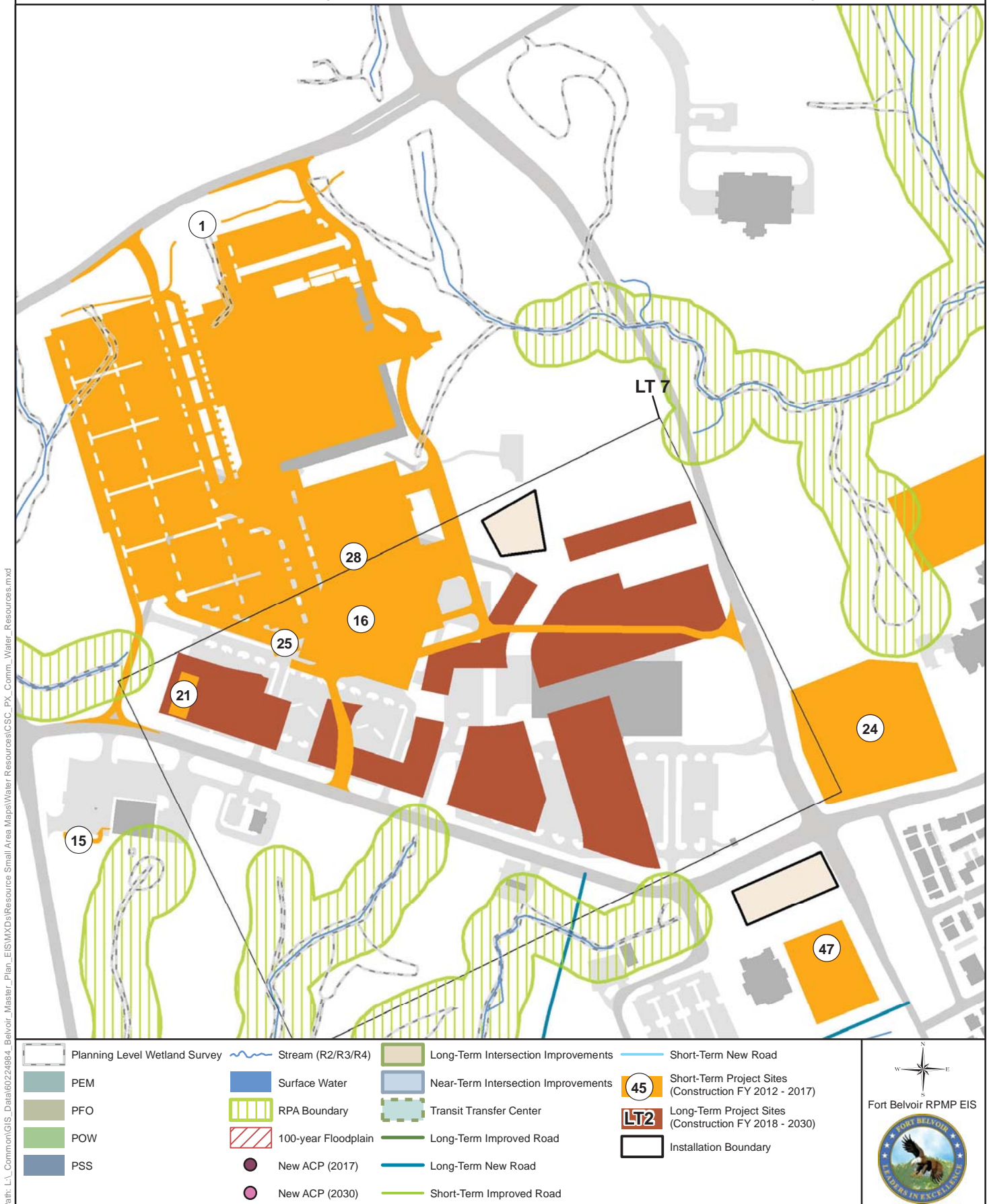
Water and Associated Sensitive Resources - DeWitt Area



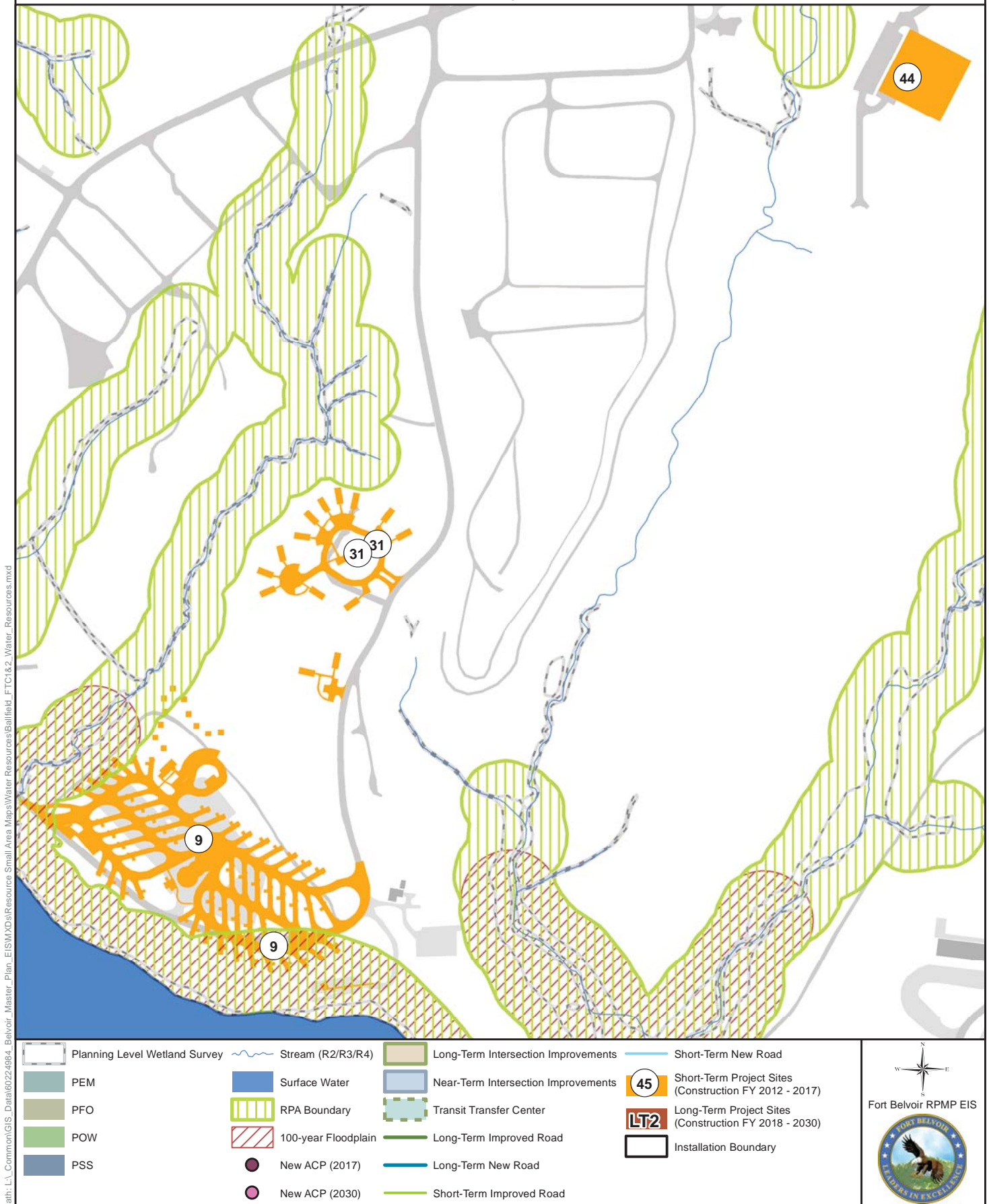
A map of the 7th Precinct, which is shaded in light green with diagonal lines. The map shows a large area with a blue river winding through it. A small orange polygon, labeled with the number 43, is located within the 7th Precinct. The map also shows a large grey area, possibly a parking lot or industrial zone, and a small brown area in the top right corner. The map is oriented with North at the top.



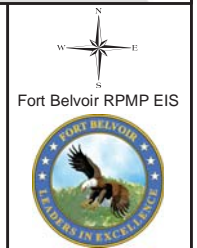
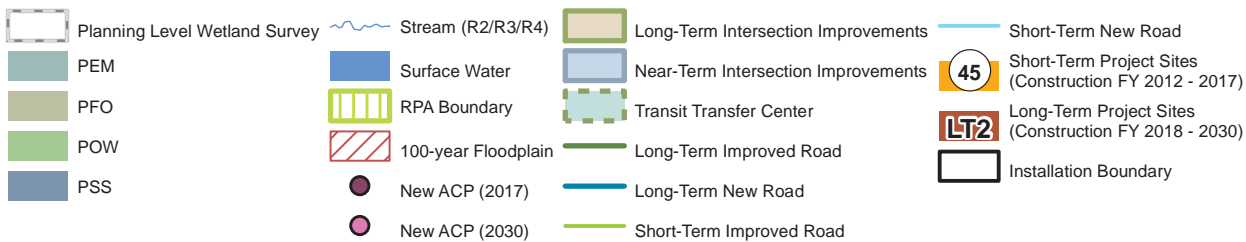
Water and Associated Sensitive Resources - Community Support Center, PX, Commissary



Water and Associated Sensitive Resources - Ballfield Replacement, Family Travel Camp Phase 1 & 2

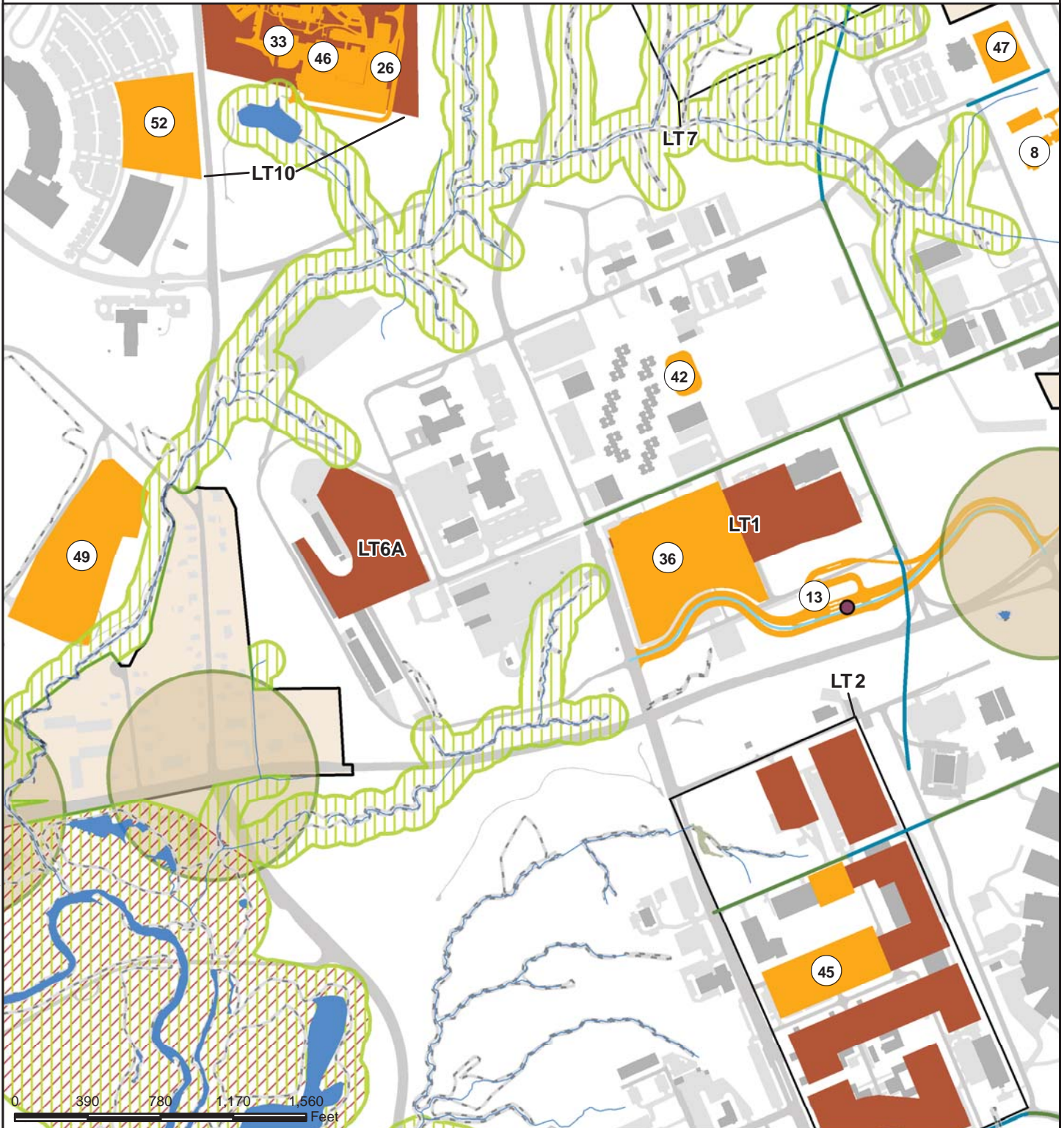


Water and Associated Sensitive Resources - Gunston Road Office Area (1400 Area & Secure Admin Facility)

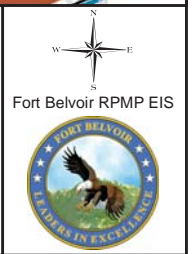


Water and Associated Sensitive Resources - 29th Infantry HQ, Lieber Gate, OCAR Block, 911th Engineering Co.

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|-------------------------------|---------------------|-------------------------------------|--|
| Planning Level Wetland Survey | Stream (R2/R3/R4) | Long-Term Intersection Improvements | Short-Term New Road |
| PEM | Surface Water | Near-Term Intersection Improvements | Short-Term Project Sites (Construction FY 2012 - 2017) |
| PFO | RPA Boundary | Transit Transfer Center | Long-Term Project Sites (Construction FY 2018 - 2030) |
| POW | 100-year Floodplain | Long-Term Improved Road | Installation Boundary |
| PSS | New ACP (2017) | Long-Term New Road | |
| | New ACP (2030) | Short-Term Improved Road | |

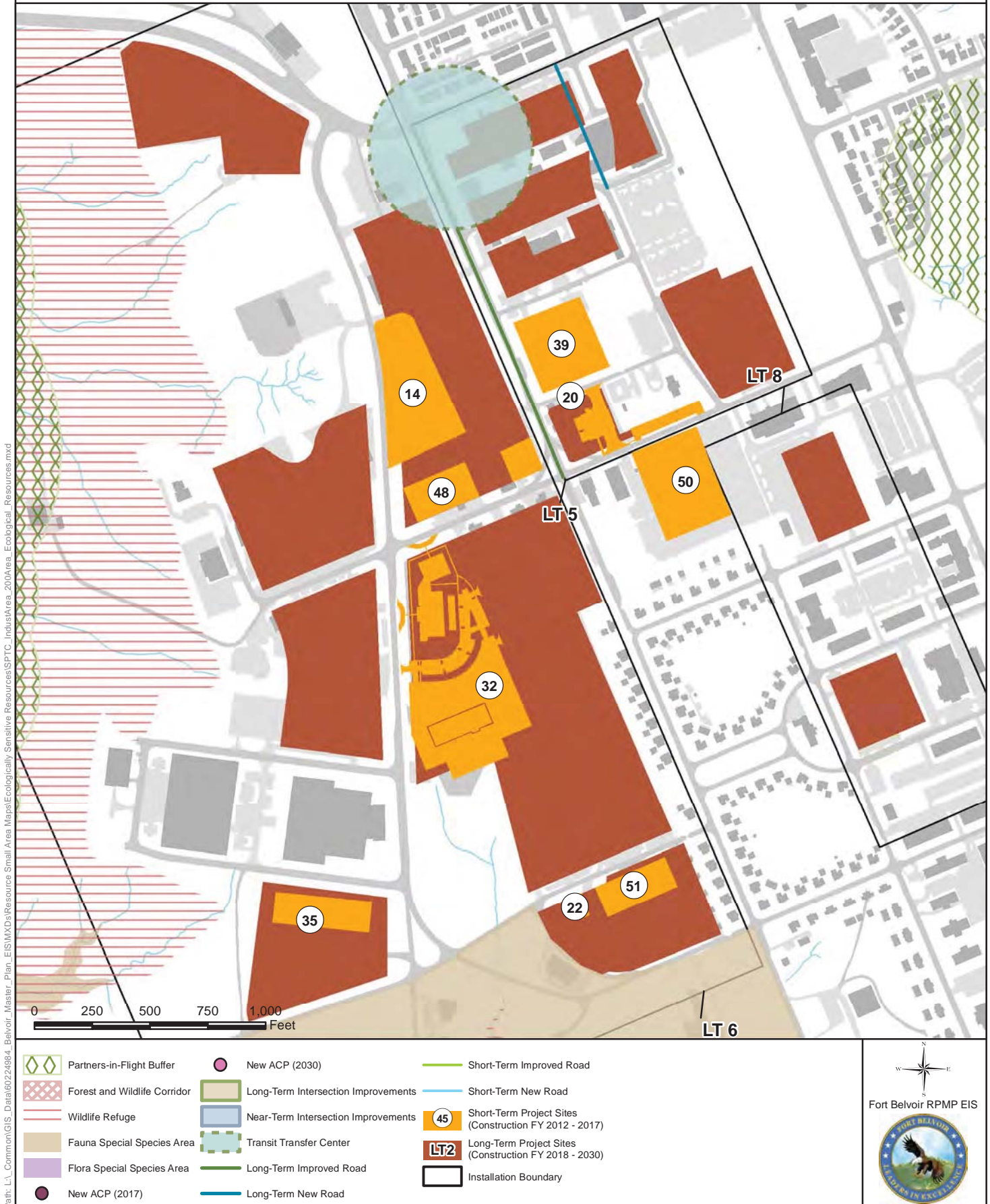


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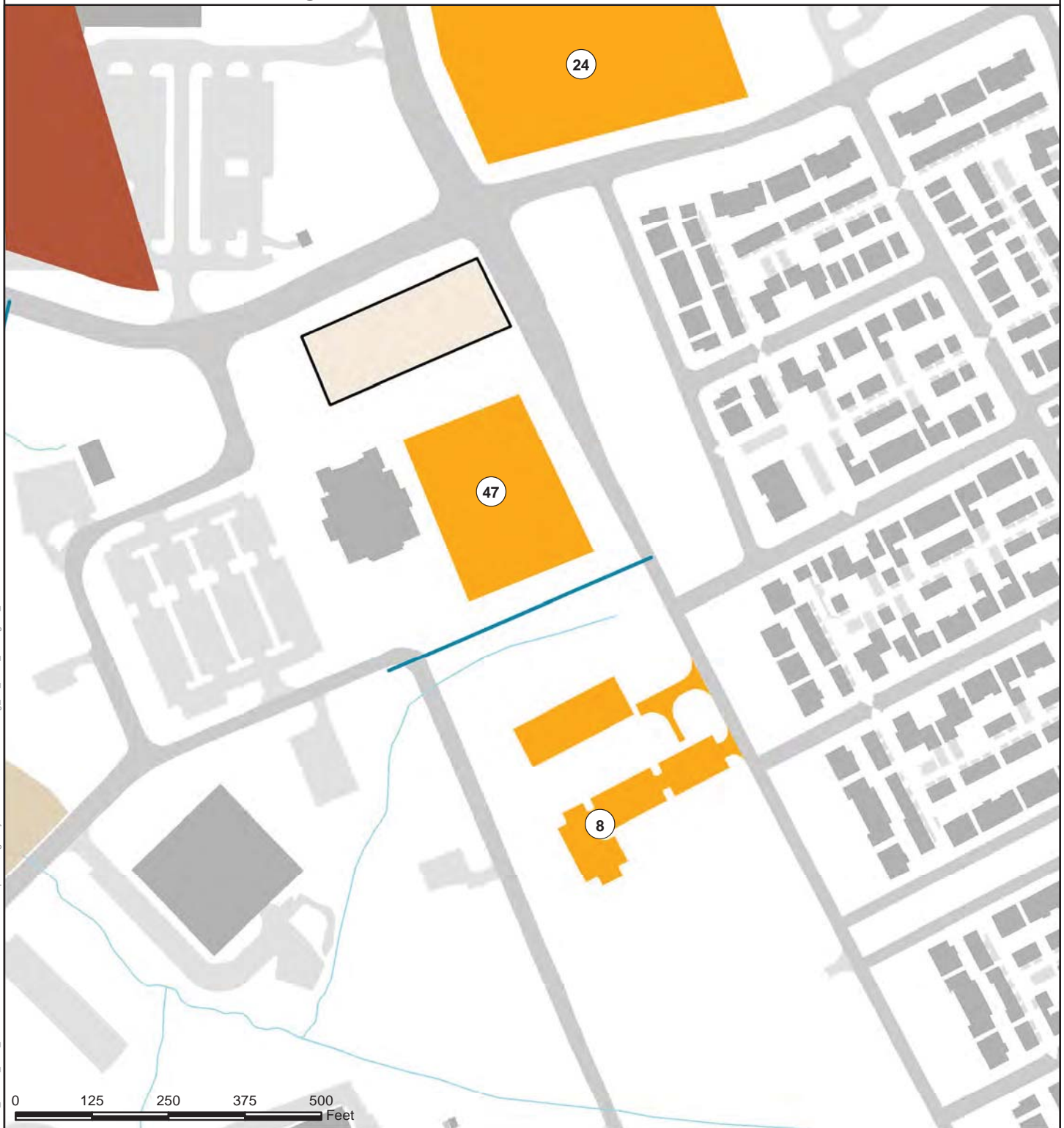
ECOLOGICAL RESOURCES SMALL AREA MAPS

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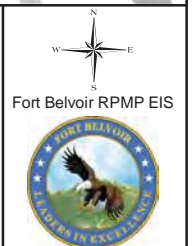
Ecologically Sensitive Resources - South Post Town Center, Industrial Area, 200 Area



Ecologically Sensitive Resources - Religious Education Center, CDC 144



- | | | |
|------------------------------|-------------------------------------|--|
| Partners-in-Flight Buffer | New ACP (2030) | Short-Term Improved Road |
| Forest and Wildlife Corridor | Long-Term Intersection Improvements | Short-Term New Road |
| Wildlife Refuge | Near-Term Intersection Improvements | Short-Term Project Sites (Construction FY 2012 - 2017) |
| Fauna Special Species Area | Transit Transfer Center | Long-Term Project Sites (Construction FY 2018 - 2030) |
| Flora Special Species Area | Long-Term Improved Road | Installation Boundary |
| New ACP (2017) | Long-Term New Road | |

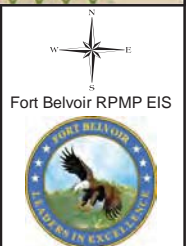


Ecologically Sensitive Resources - NMUSA & Golf Course Reconfiguration

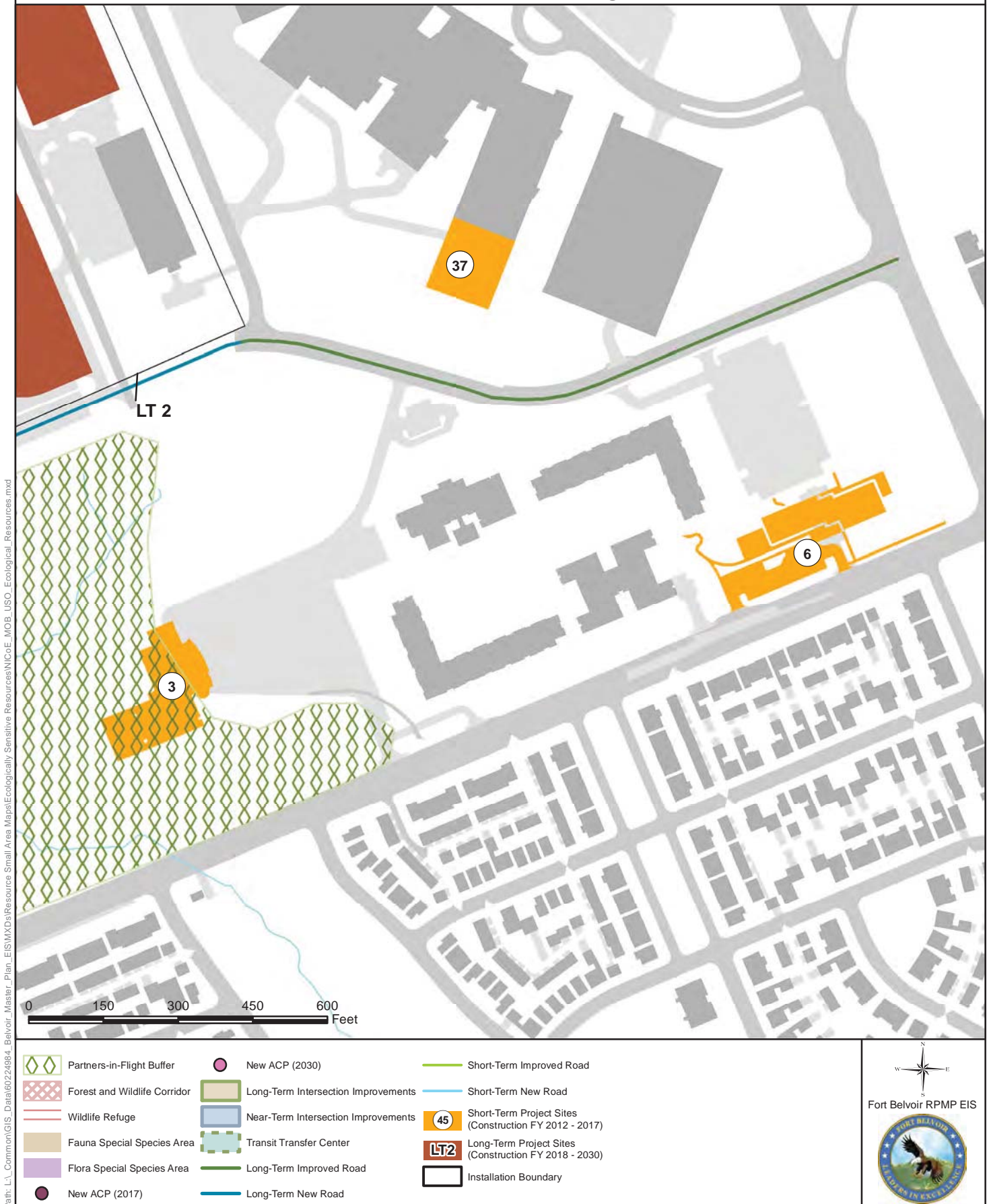
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|------------------------------|-------------------------------------|--|
| Partners-in-Flight Buffer | New ACP (2030) | Short-Term Improved Road |
| Forest and Wildlife Corridor | Long-Term Intersection Improvements | Short-Term New Road |
| Wildlife Refuge | Near-Term Intersection Improvements | Short-Term Project Sites (Construction FY 2012 - 2017) |
| Fauna Special Species Area | Transit Transfer Center | Long-Term Project Sites (Construction FY 2018 - 2030) |
| Flora Special Species Area | Long-Term Improved Road | Installation Boundary |
| New ACP (2017) | Long-Term New Road | |

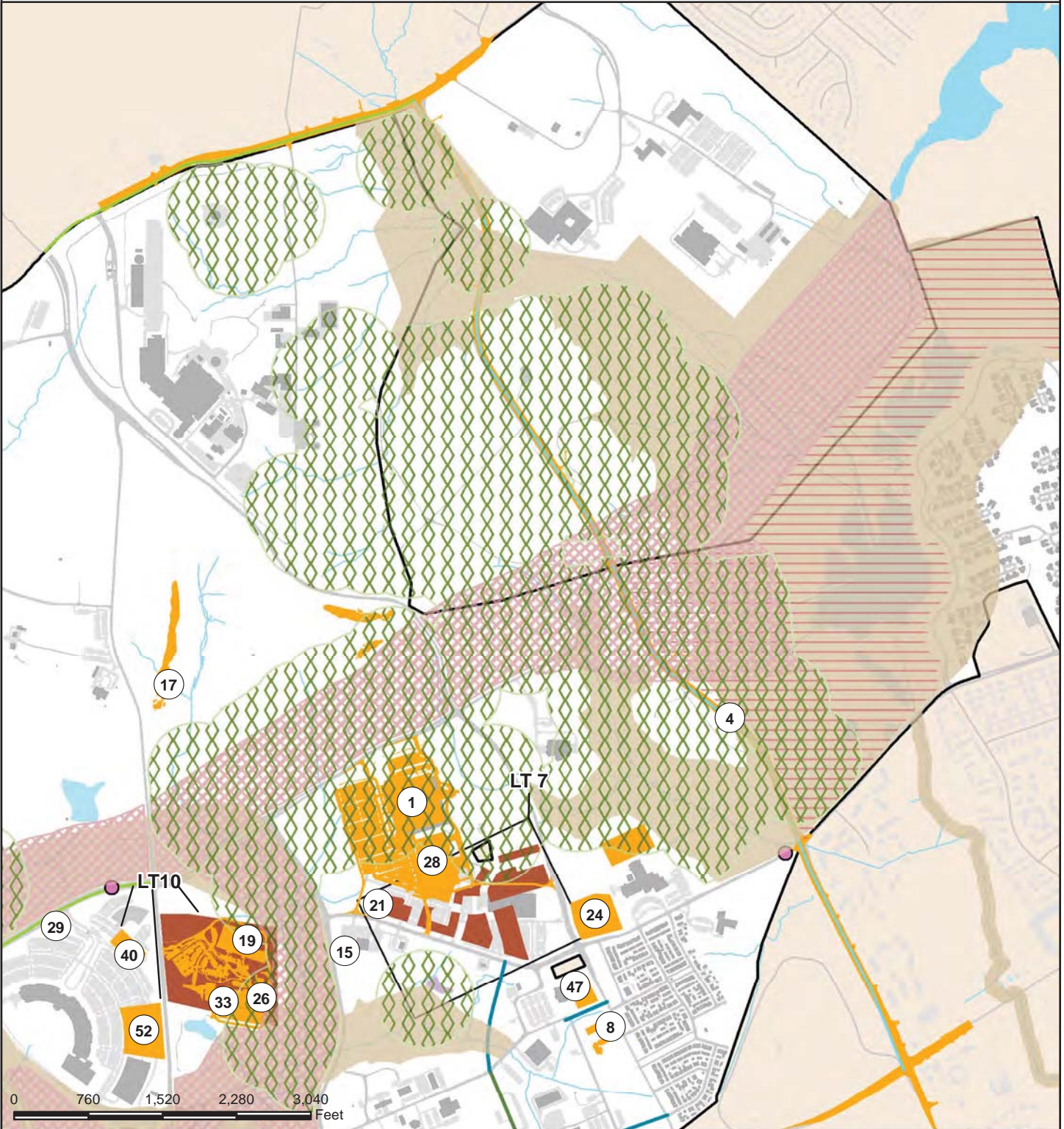


Ecologically Sensitive Resources - NlCoE, Medical Office Building, USO

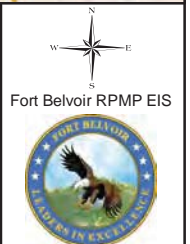


Ecologically Sensitive Resources - Mulligan Road

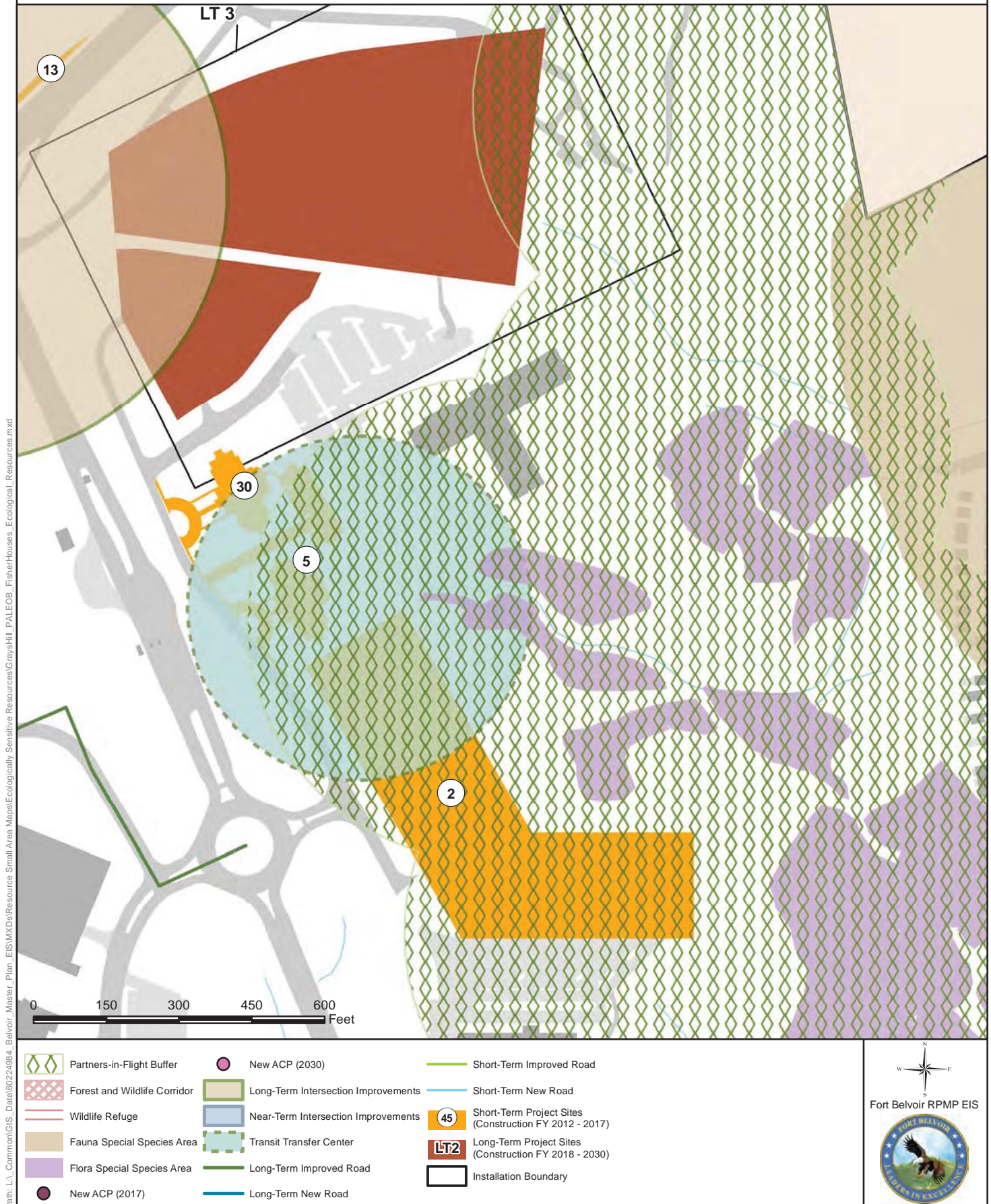
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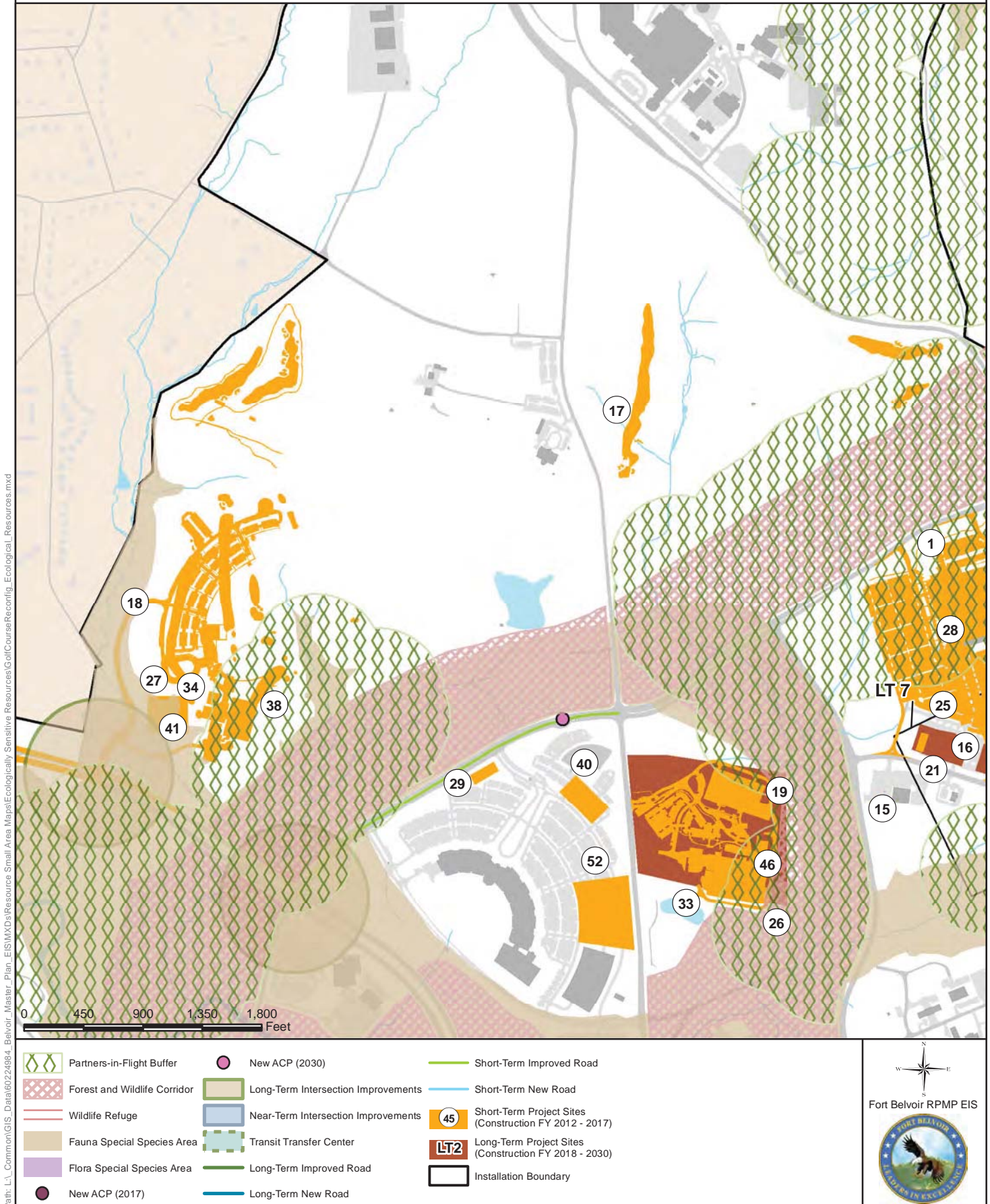
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|------------------------------|-------------------------------------|--|
| Partners-in-Flight Buffer | New ACP (2030) | Short-Term Improved Road |
| Forest and Wildlife Corridor | Long-Term Intersection Improvements | Short-Term New Road |
| Wildlife Refuge | Near-Term Intersection Improvements | Short-Term Project Sites (Construction FY 2012 - 2017) |
| Fauna Special Species Area | Transit Transfer Center | Long-Term Project Sites (Construction FY 2018 - 2030) |
| Flora Special Species Area | Long-Term Improved Road | Installation Boundary |
| New ACP (2017) | Long-Term New Road | |



Ecologically Sensitive Resources - Grays Hill, PAL East of Belvoir Rd, Fisher House 1 & 2

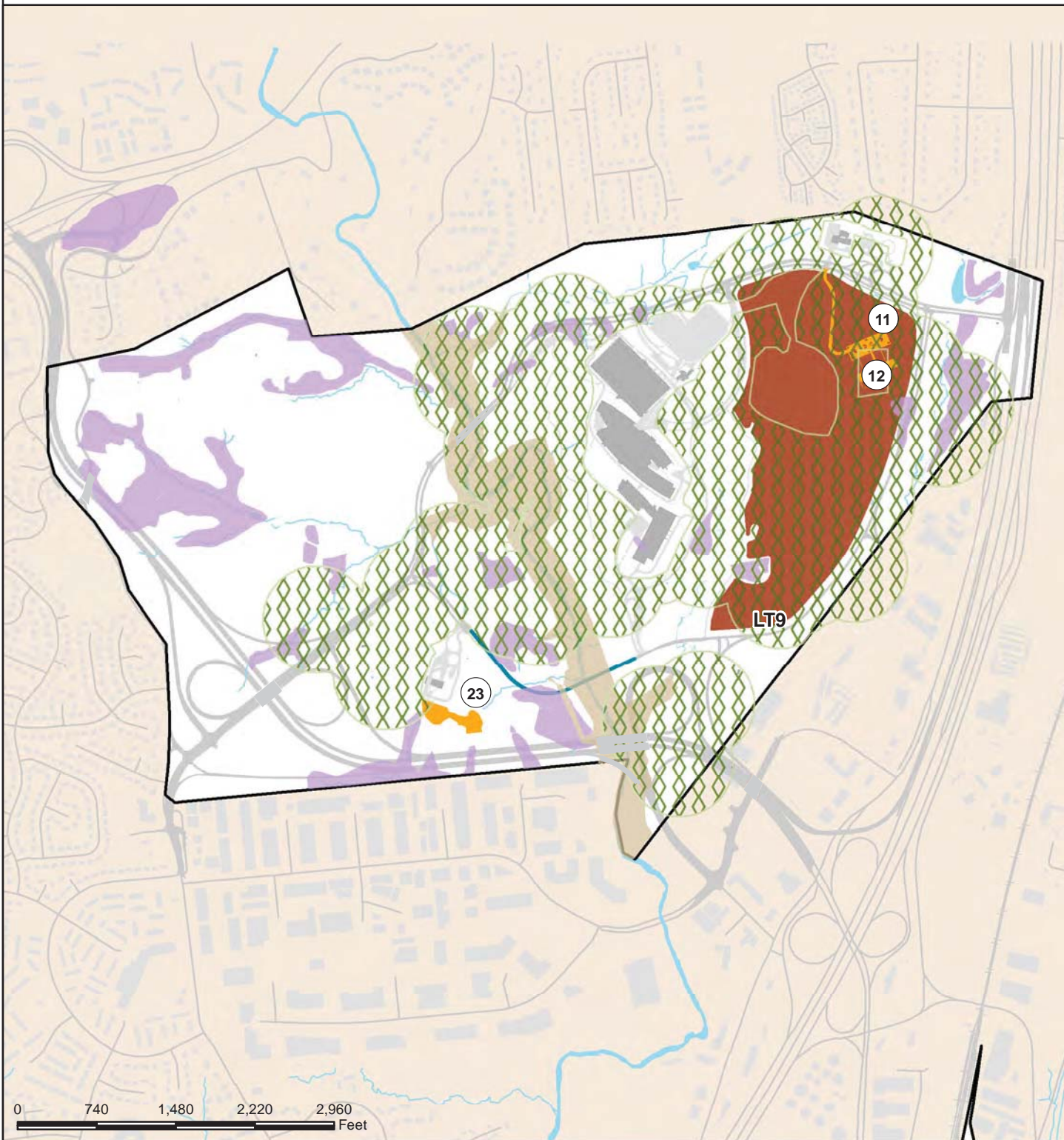


Ecologically Sensitive Resources - Golf Course Reconfiguration



Ecologically Sensitive Resources - Fort Belvoir North Area

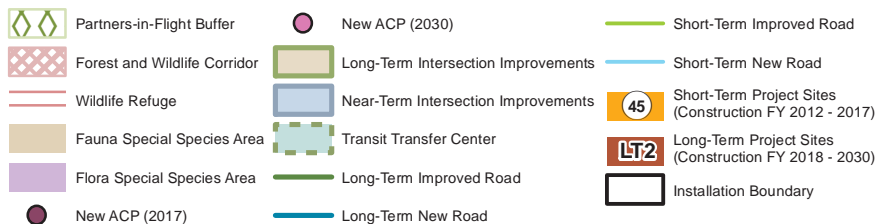
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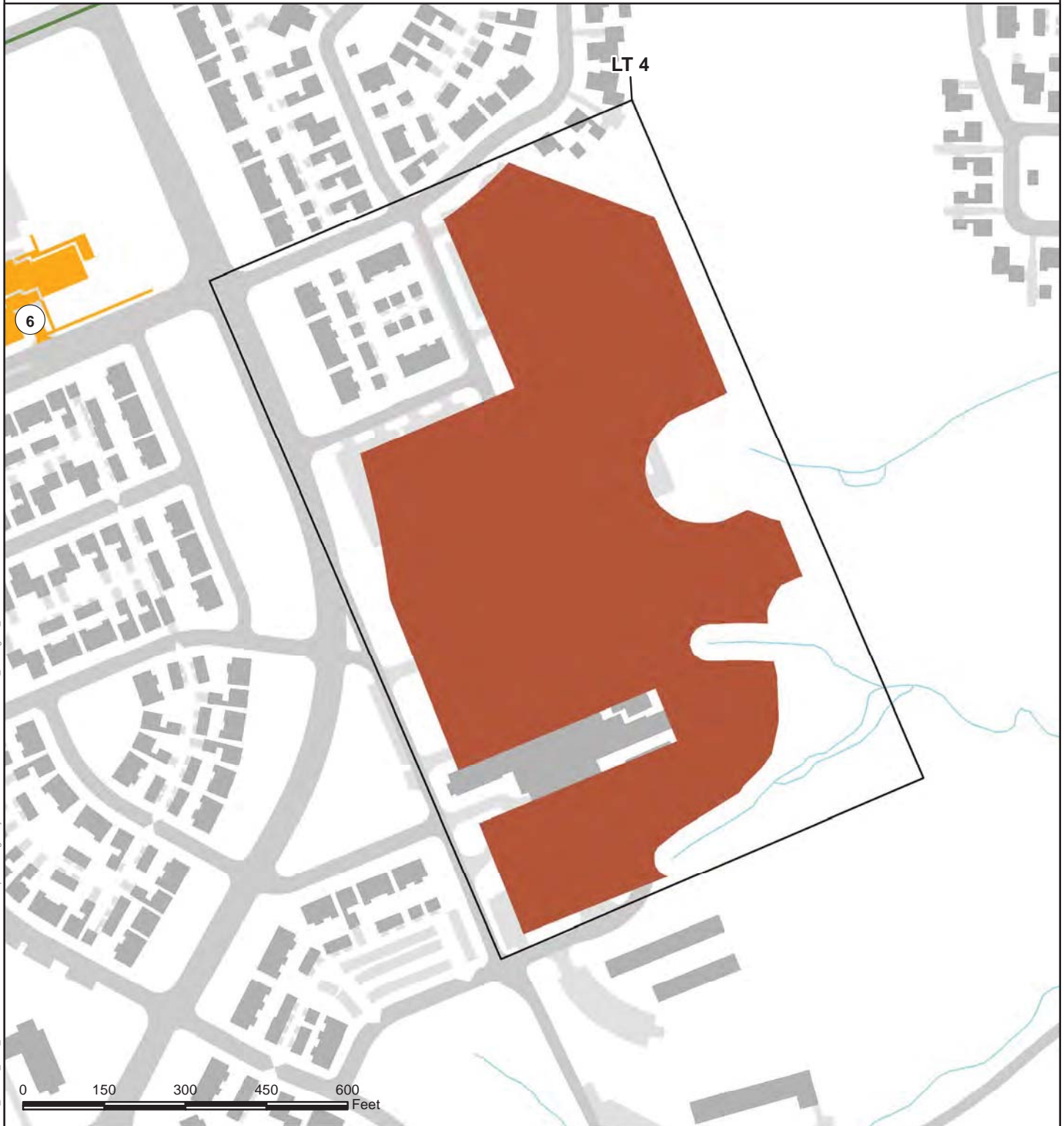
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|--|------------------------------|--|-------------------------------------|--|---|
| | Partners-in-Flight Buffer | | New ACP (2030) | | Short-Term Improved Road |
| | Forest and Wildlife Corridor | | Long-Term Intersection Improvements | | Short-Term New Road |
| | Wildlife Refuge | | Near-Term Intersection Improvements | | Short-Term Project Sites
(Construction FY 2012 - 2017) |
| | Fauna Special Species Area | | Transit Transfer Center | | Long-Term Project Sites
(Construction FY 2018 - 2030) |
| | Flora Special Species Area | | Long-Term Improved Road | | Installation Boundary |
| | New ACP (2017) | | Long-Term New Road | | |



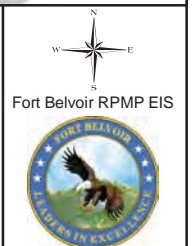
This map shows the LT10 area, which is a large, irregularly shaped lot. The map includes several smaller lots, each labeled with a number in a white circle: 29, 40, 52, 19, 26, 46, and 33. The LT10 area is highlighted in orange. A scale bar at the bottom indicates distances in feet, ranging from 0 to 800. The map also shows surrounding streets and a green hatched area on the right side.



Ecologically Sensitive Resources - DeWitt Area



- | | | | | | |
|--|------------------------------|--|-------------------------------------|--|---|
| | Partners-in-Flight Buffer | | New ACP (2030) | | Short-Term Improved Road |
| | Forest and Wildlife Corridor | | Long-Term Intersection Improvements | | Short-Term New Road |
| | Wildlife Refuge | | Near-Term Intersection Improvements | | Short-Term Project Sites
(Construction FY 2012 - 2017) |
| | Fauna Special Species Area | | Transit Transfer Center | | Long-Term Project Sites
(Construction FY 2018 - 2030) |
| | Flora Special Species Area | | Long-Term Improved Road | | Installation Boundary |
| | New ACP (2017) | | Long-Term New Road | | |

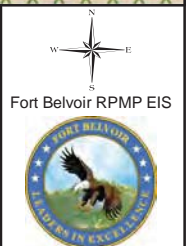


Ecologically Sensitive Resources - Davison Army Airfield

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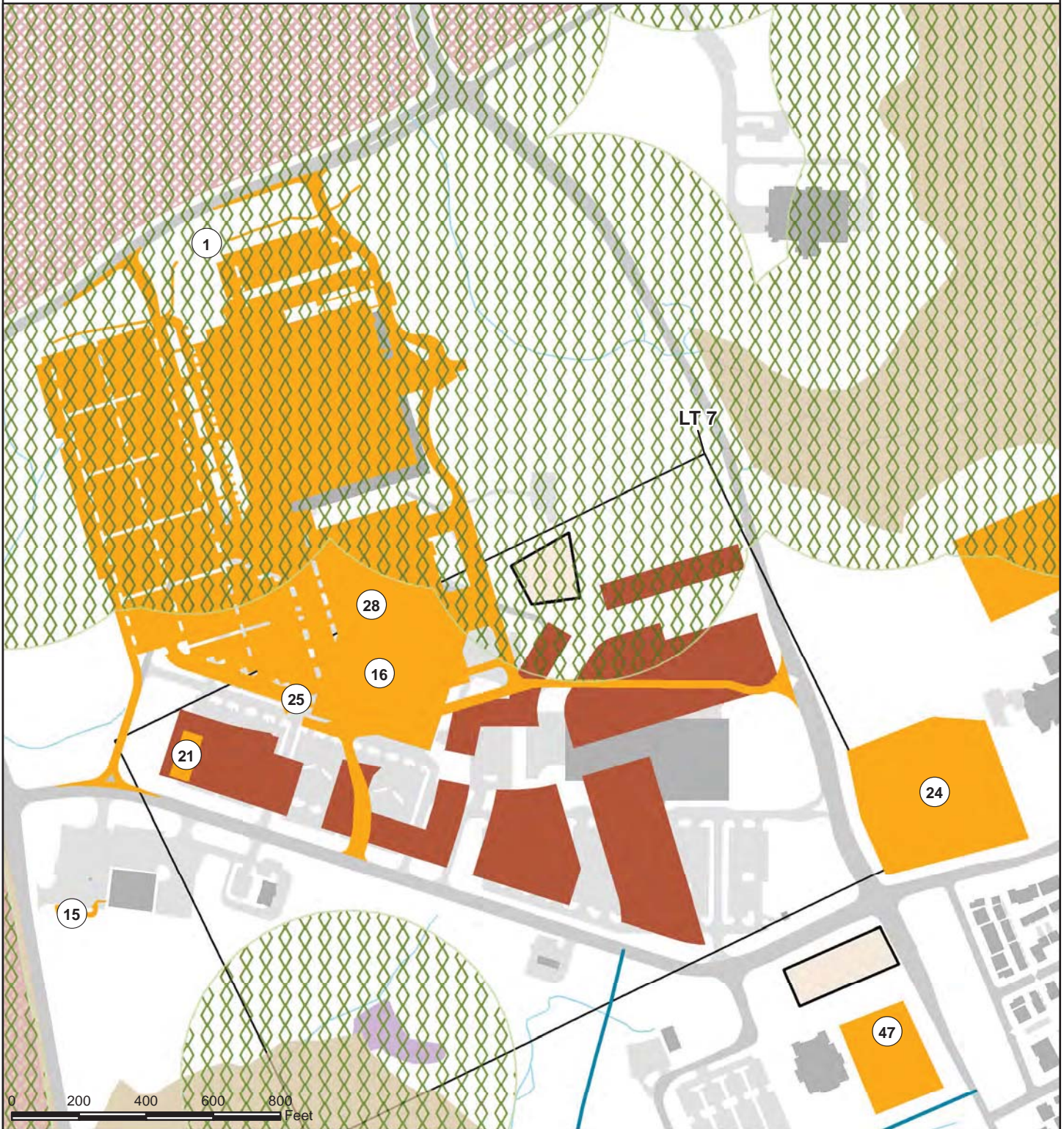


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|------------------------------|-------------------------------------|---|
| Partners-in-Flight Buffer | New ACP (2030) | Short-Term Improved Road |
| Forest and Wildlife Corridor | Long-Term Intersection Improvements | Short-Term New Road |
| Wildlife Refuge | Near-Term Intersection Improvements | Short-Term Project Sites
(Construction FY 2012 - 2017) |
| Fauna Special Species Area | Transit Transfer Center | Long-Term Project Sites
(Construction FY 2018 - 2030) |
| Flora Special Species Area | Long-Term Improved Road | Installation Boundary |
| New ACP (2017) | Long-Term New Road | |

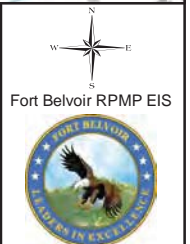


Ecologically Sensitive Resources - Community Support Center, PX, Commissary

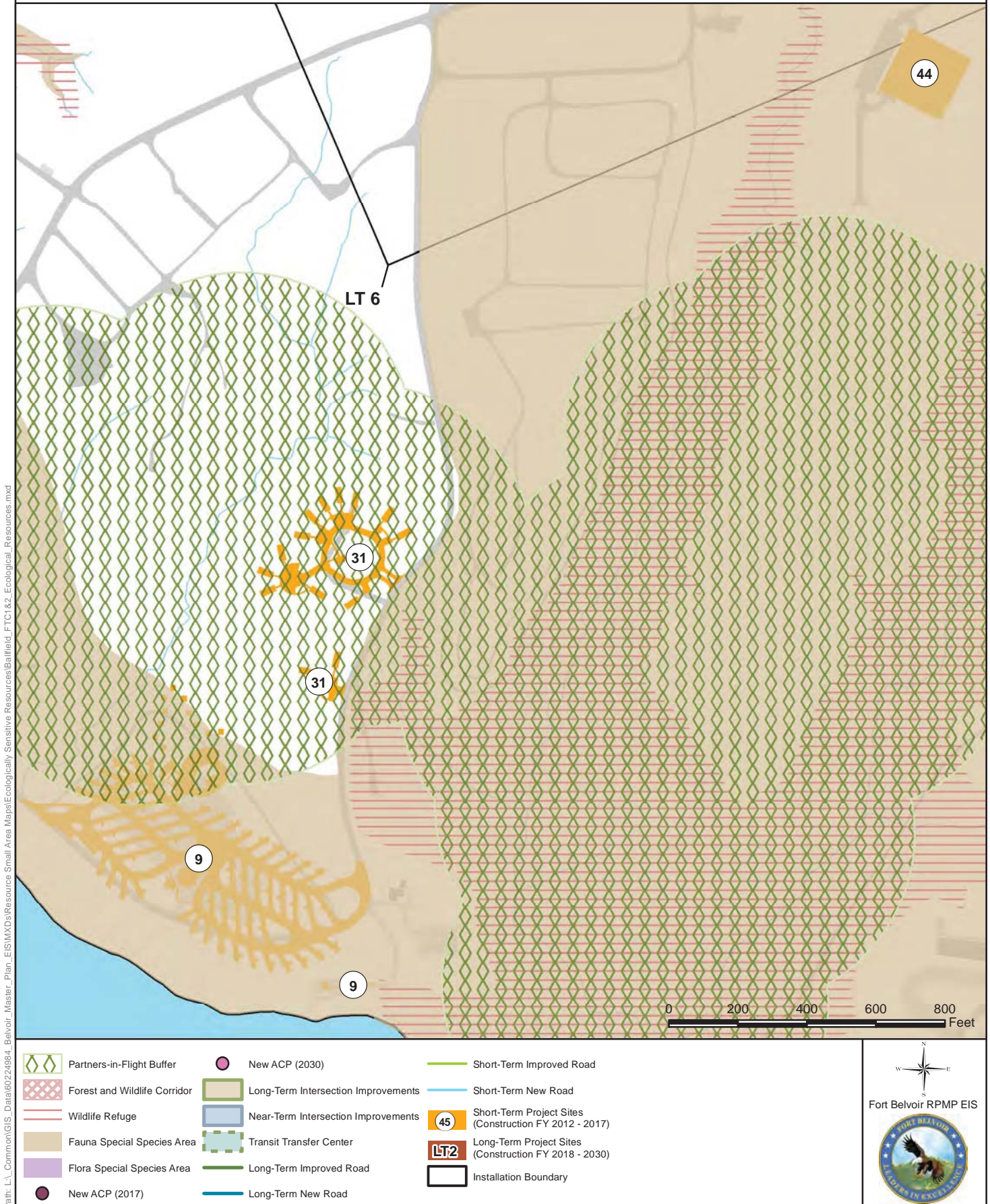
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|--|------------------------------|--|-------------------------------------|--|---|
| | Partners-in-Flight Buffer | | New ACP (2030) | | Short-Term Improved Road |
| | Forest and Wildlife Corridor | | Long-Term Intersection Improvements | | Short-Term New Road |
| | Wildlife Refuge | | Near-Term Intersection Improvements | | Short-Term Project Sites
(Construction FY 2012 - 2017) |
| | Fauna Special Species Area | | Transit Transfer Center | | Long-Term Project Sites
(Construction FY 2018 - 2030) |
| | Flora Special Species Area | | Long-Term Improved Road | | Installation Boundary |
| | New ACP (2017) | | Long-Term New Road | | |



Ecologically Sensitive Resources - Ballfield Replacement, Family Travel Camp Phase 1 & 2

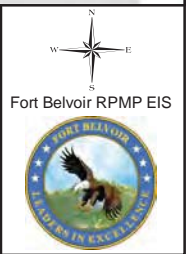


Ecologically Sensitive Resources - Gunston Road Office Area (1400 Area & Secure Admin Facility)



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|------------------------------|-------------------------------------|--|
| Partners-in-Flight Buffer | New ACP (2030) | Short-Term Improved Road |
| Forest and Wildlife Corridor | Long-Term Intersection Improvements | Short-Term New Road |
| Wildlife Refuge | Near-Term Intersection Improvements | Short-Term Project Sites (Construction FY 2012 - 2017) |
| Fauna Special Species Area | Transit Transfer Center | Long-Term Project Sites (Construction FY 2018 - 2030) |
| Flora Special Species Area | Long-Term Improved Road | Installation Boundary |
| New ACP (2017) | Long-Term New Road | |

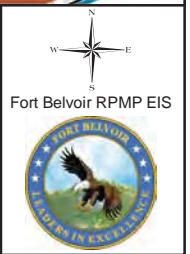


Ecologically Sensitive Resources - 29th Infantry HQ, Lieber Gate, OCAR Block, 911th Engineering Co.

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|------------------------------|-------------------------------------|--|
| Partners-in-Flight Buffer | New ACP (2030) | Short-Term Improved Road |
| Forest and Wildlife Corridor | Long-Term Intersection Improvements | Short-Term New Road |
| Wildlife Refuge | Near-Term Intersection Improvements | Short-Term Project Sites (Construction FY 2012 - 2017) |
| Fauna Special Species Area | Transit Transfer Center | Long-Term Project Sites (Construction FY 2018 - 2030) |
| Flora Special Species Area | Long-Term Improved Road | Installation Boundary |
| New ACP (2017) | Long-Term New Road | |



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APPENDIX G
GEOLOGY, TOPOGRAPHY, AND SOILS

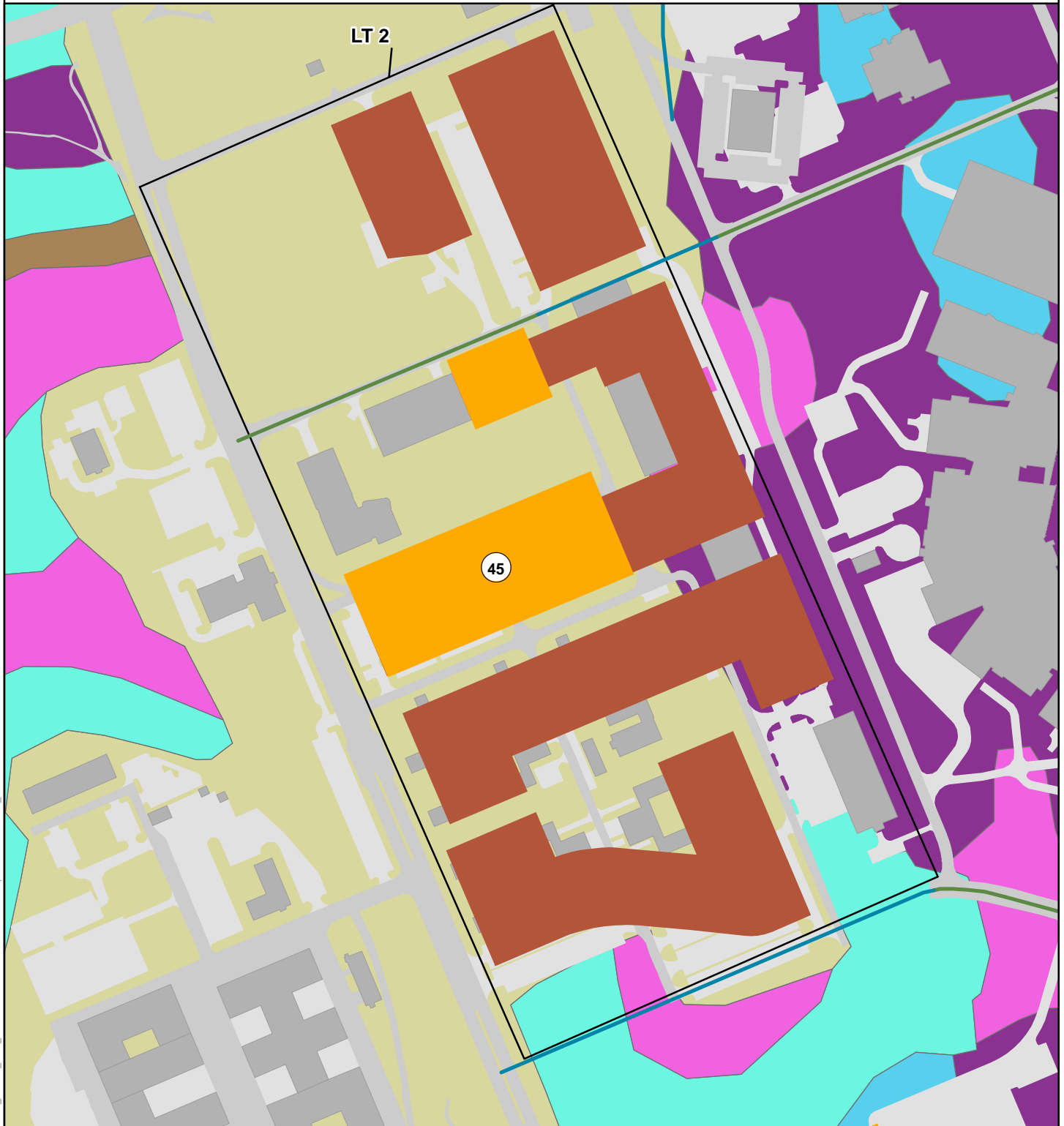
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TABLE OF CONTENTS











Soils Small Area Maps	G-1
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Soils - Gunston Road Office Area (1400 Area & Secure Admin Facility)



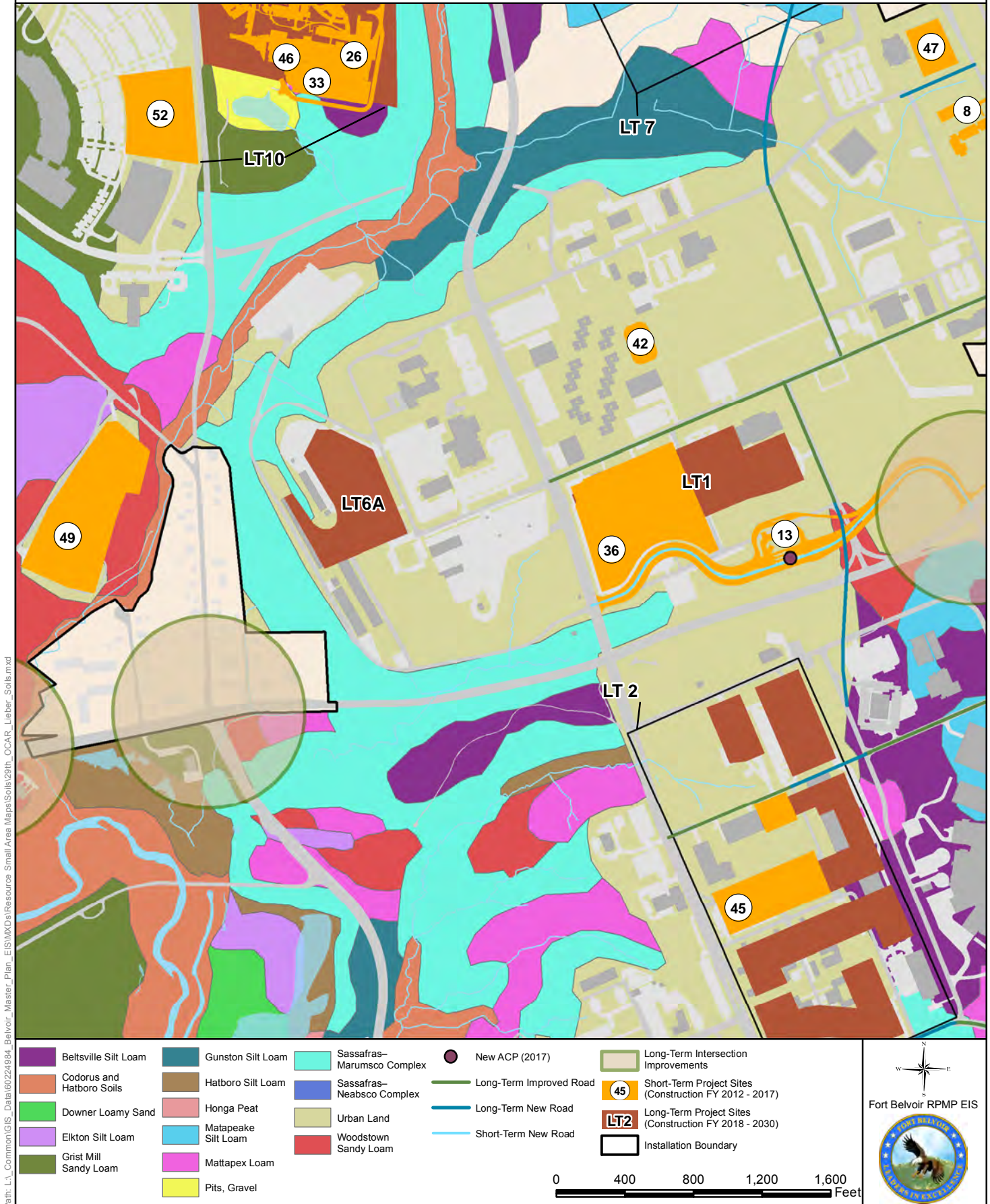
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- | | |
|---|---|
|  Beltsville Silt Loam |  Long-Term Improved Road |
|  Hatboro Silt Loam |  Long-Term New Road |
|  Matapeake Silt Loam |  Short-Term Project Sites
(Construction FY 2012 - 2017) |
|  Mattapex Loam |  Long-Term Project Sites
(Construction FY 2018 - 2030) |
|  Sassafras-Marumsc Complex | |
|  Urban Land | |

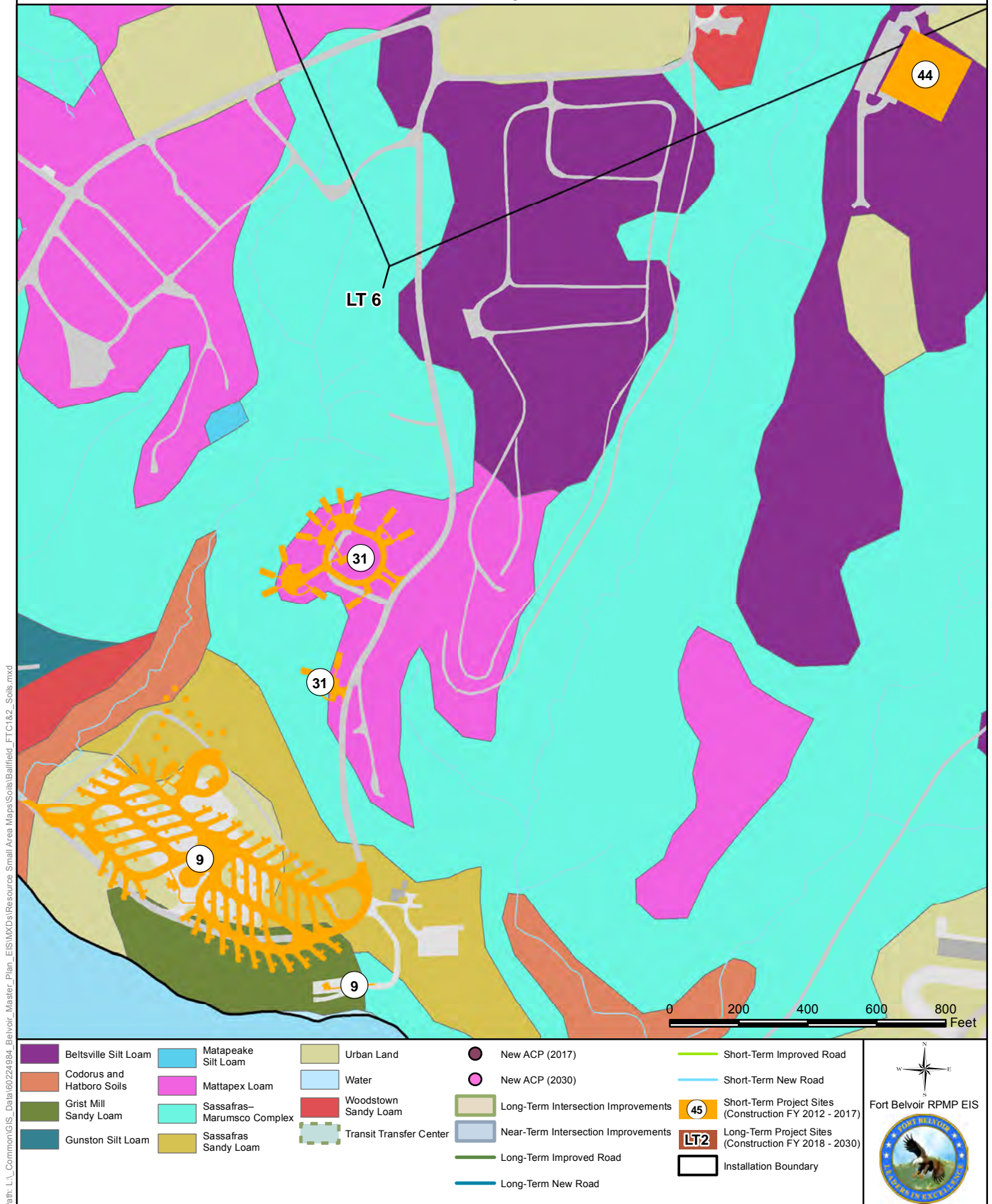
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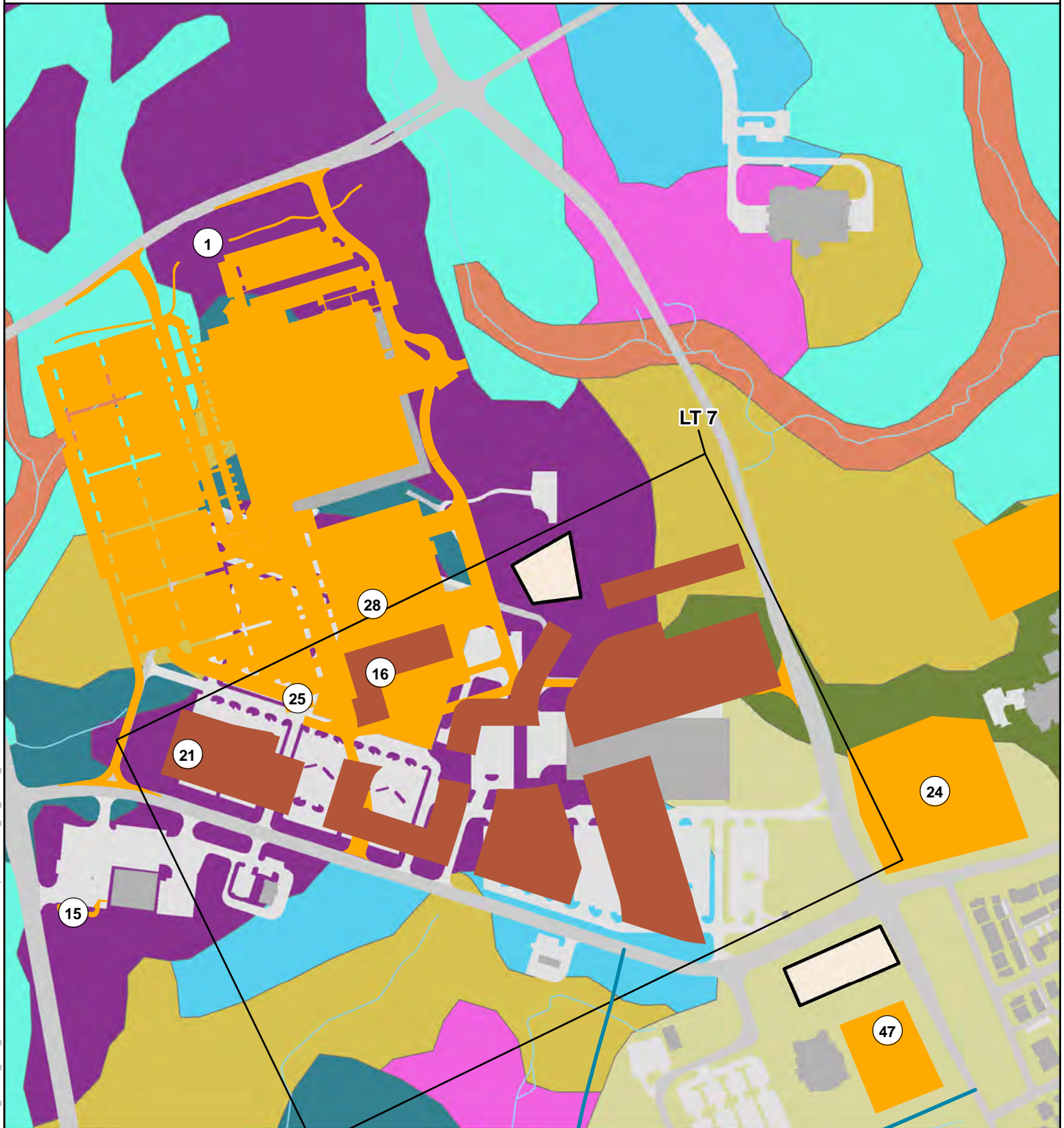
Soils - 29th Infantry HQ, Lieber Gate, OCAR Block, 911th Engineering Co.



Soils - Ballfield Replacement, Family Travel Camp Phase 1 & 2



Soils - Community Support Center, PX, Commissary

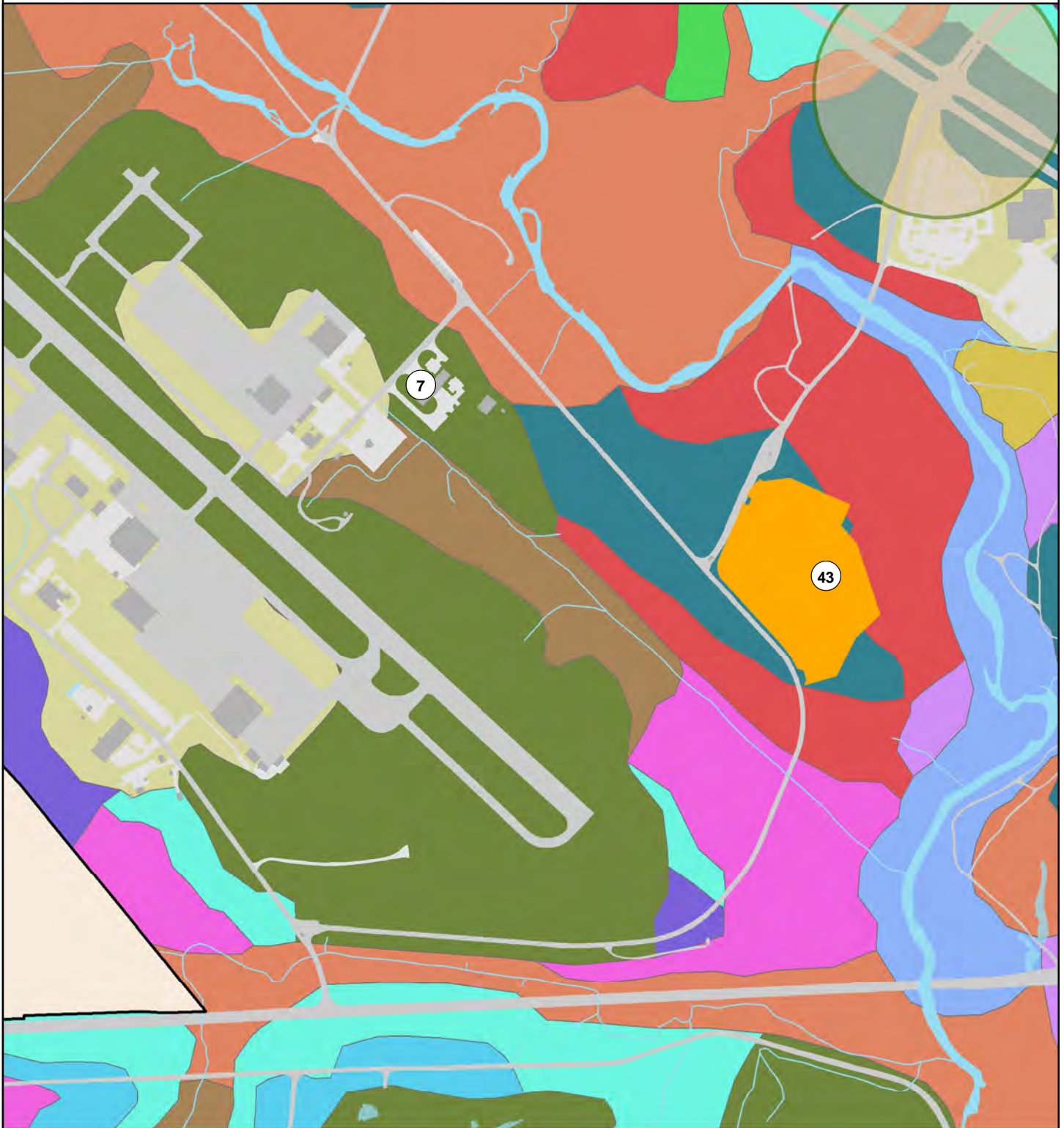


- | | | |
|---------------------------|---------------------------|---|
| Beltsville Silt Loam | Mattapex Loam | Long-Term New Road |
| Codorus and Hatboro Soils | Sassafras-Marumsc Complex | 45 Short-Term Project Sites (Construction FY 2012 - 2017) |
| Grist Mill Sandy Loam | Sassafras Sandy Loam | LT2 Long-Term Project Sites (Construction FY 2018 - 2030) |
| Gunston Silt Loam | Urban Land | Installation Boundary |
| Matapeake Silt Loam | | |

0 200 400 600 800 Feet



Soils - Davison Army Airfield

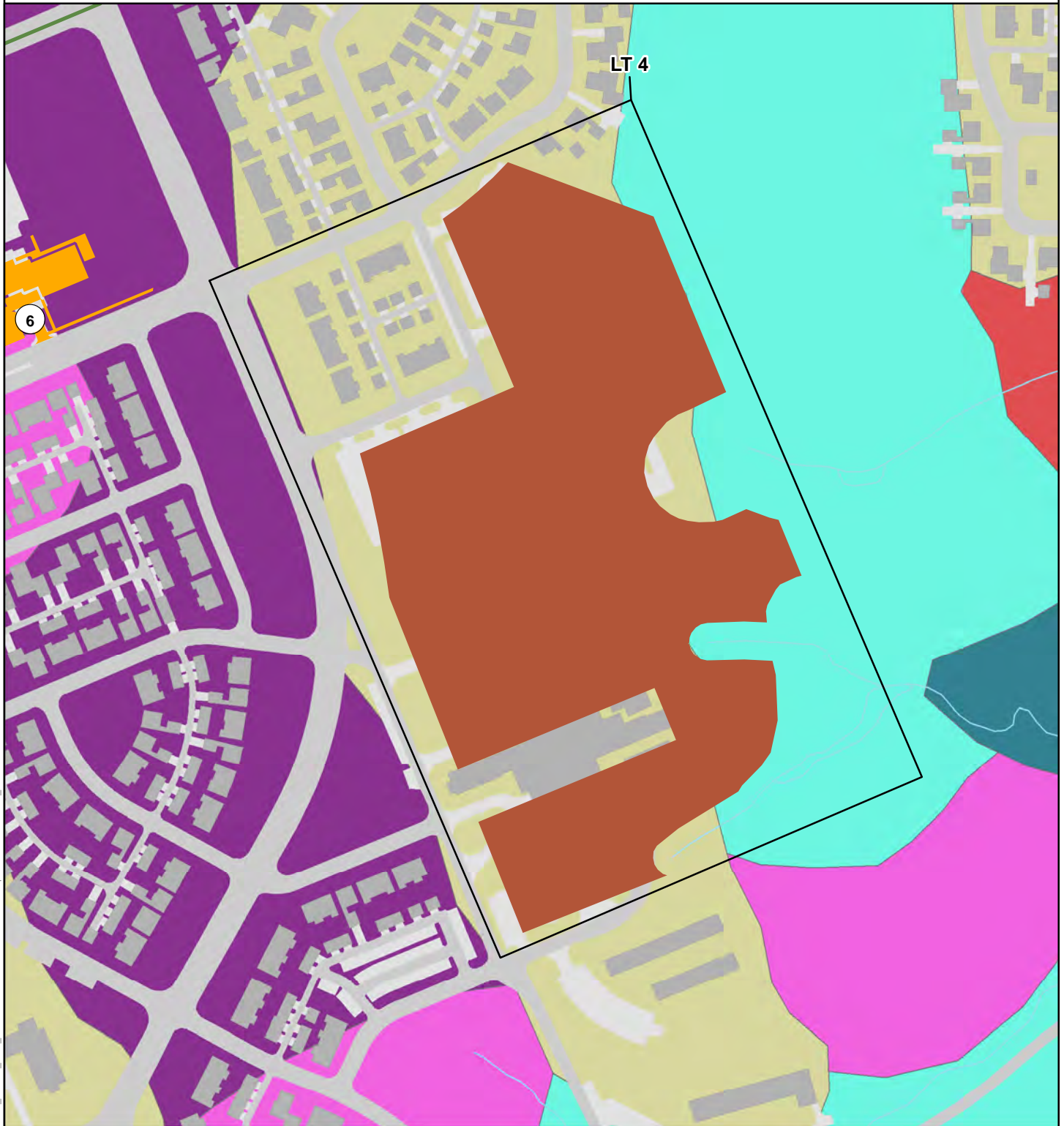


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|---------------------------|-----------------------|----------------------------|----------------------|--|
| Beltsville Silt Loam | Elkton Silt Loam | Lunt-Marumsko Complex | Sassafras Sandy Loam | Long-Term Intersection Improvements |
| Codorus Silt Loam | Grist Mill Sandy Loam | Matapeake Silt Loam | Urban Land | Short-Term Project Sites (Construction FY 2012 - 2017) |
| Codorus and Hatboro Soils | Gunston Silt Loam | Mattapex Loam | Woodstown Sandy Loam | Installation Boundary |
| Downer Loamy Sand | Hatboro Silt Loam | Sassafras-Marumsko Complex | | |










0 350 700 1,050 1,400 Feet



Soils - DeWitt Area



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|--|---|---|
|  Beltsville Silt Loam |  Sassafras-Marumsc Complex |  Long-Term Improved Road |
|  Gunston Silt Loam |  Urban Land |  Short-Term Project Sites
(Construction FY 2012 - 2017) |
|  Mattapex Loam |  Woodstown Sandy Loam |  Long-Term Project Sites
(Construction FY 2018 - 2030) |

0 150 300 450 600 Feet



Soils - DLA & INSCOM



- | | | | |
|---------------------------|----------------------------|---|--|
| Beltsville Silt Loam | Gunston Silt Loam | Sassafras Sandy Loam | New ACP (2030) |
| Codorus and Hatboro Soils | Mattapex Loam | Urban Land | Short-Term Improved Road |
| Elkton Silt Loam | Pits, Gravel | Woodstown Sandy Loam | Short-Term Project Sites (Construction FY 2012 - 2017) |
| Grist Mill Sandy Loam | Sassafras-Marumsco Complex | Long-Term Project Sites (Construction FY 2018 - 2030) | |

0 200 400 600 800 Feet



Soils - Fort Belvoir North Area



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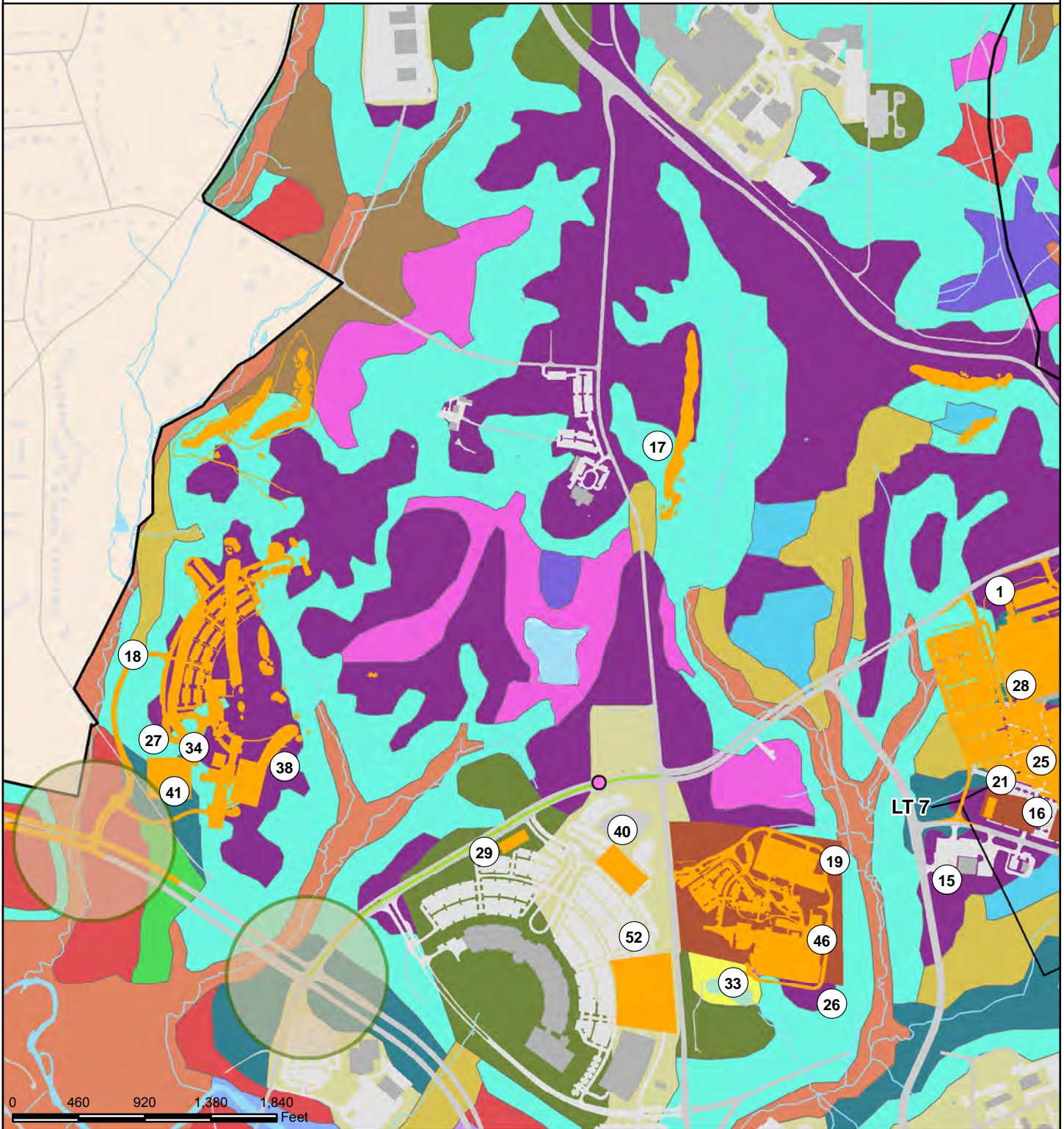
Barkers Crossroads–Rhodhiss Complex	Kingstowne–Sassafras Complex	Pits, Gravel	Sassafras Sandy Loam
Beltsville Silt Loam	Kingstowne Sandy Clay Loam	Rhodhiss–Rock Outcrop Complex	Urban Land
Codorus and Hatboro Soils	Matapeake Silt Loam	Rhodhiss Sandy Loam	Long-Term New Road
Fairfax Loam	Meadowville Loam	Sassafras–Marumsc Complex	Installation Boundary
Glenelg Silt Loam	Nathalie Gravelly Loam	Sassafras–Neabsco Complex	

0 750 1,500 2,250 3,000 Feet



Soils- Golf Course Reconfiguration

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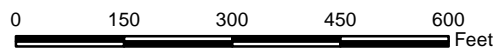
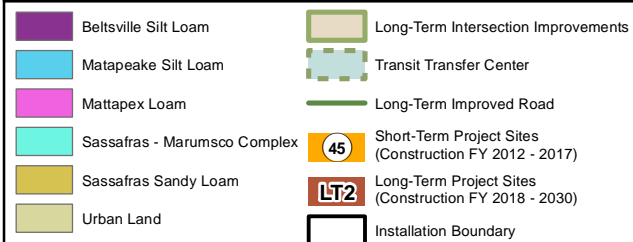


Beltsville Silt Loam	Grist Mill Sandy Loam	Matapeake Silt Loam	Sassafras Sandy Loam	Long-Term Intersection Improvements
Codorus Silt Loam	Gunston Silt Loam	Mattapex Loam	Urban Land	Short-Term Improved Road
Codorus and Hatboro Soils	Hatboro Silt Loam	Meadowville Loam	Water	Short-Term Project Sites (Construction FY 2012 - 2017)
Downer Loamy Sand	Kingstowne-Sassafras-Neabsco Complex	Pits, Gravel	Woodstown Sandy Loam	Long-Term Project Sites (Construction FY 2018 - 2030)
Elkton Silt Loam	Lunt-Marumsco Complex	Sassafras-Marumsco Complex	New ACP (2030)	Installation Boundary



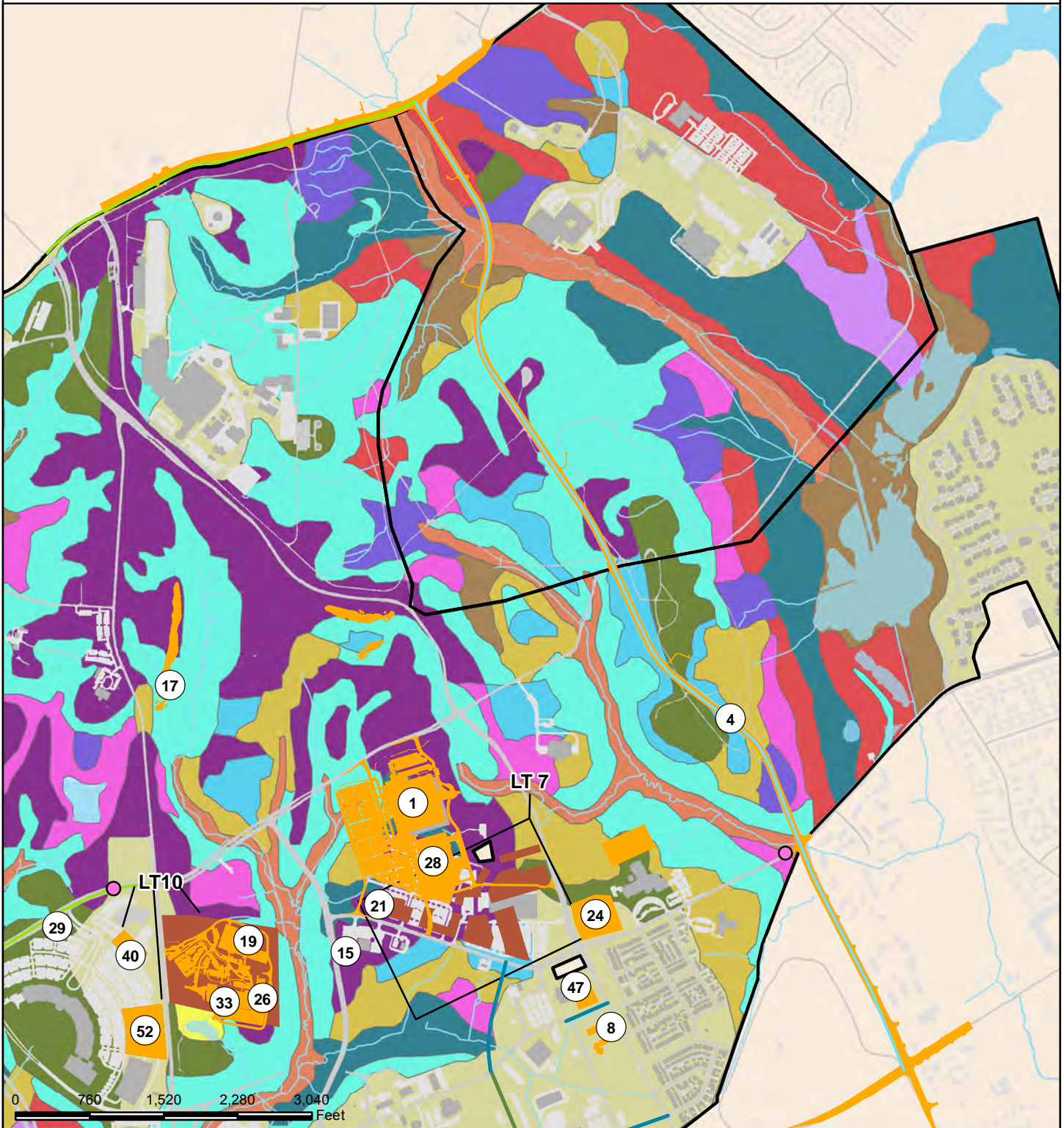
This aerial map of the University of Illinois at Chicago campus features several key elements:

- Map Labels:**
 - LT 3:** Located at the top left, with a line pointing to a specific area.
 - 13:** A circled number in the top left corner.
 - 30:** A circled number near a yellow gear-like icon.
 - 5:** A circled number in the center, near a dashed green circle.
 - 2:** A circled number in the bottom center, near a large orange L-shaped area.
- Color-coded Areas:**
 - Red:** Large area in the top left.
 - Orange:** Large L-shaped area in the bottom center.
 - Yellow:** Gear-like icon and some building footprints.
 - Green:** Dashed circle in the center.
 - Blue:** Large area on the right side.
 - Purple:** Areas along the left and bottom edges.
 - Pink:** Small area in the bottom right.
- Infrastructure:**
 - Highways:** Represented by thick grey lines.
 - Streets:** Represented by thinner grey lines.
 - Waterways:** Represented by blue lines.
 - Buildings:** Represented by various colored polygons.



Soils - Mulligan Road

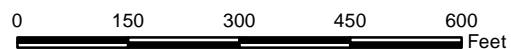
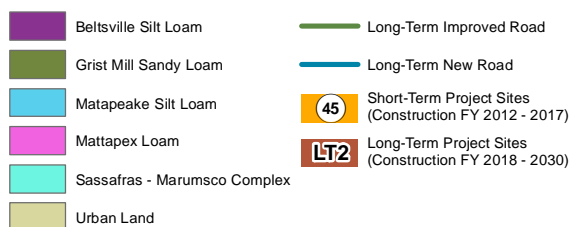
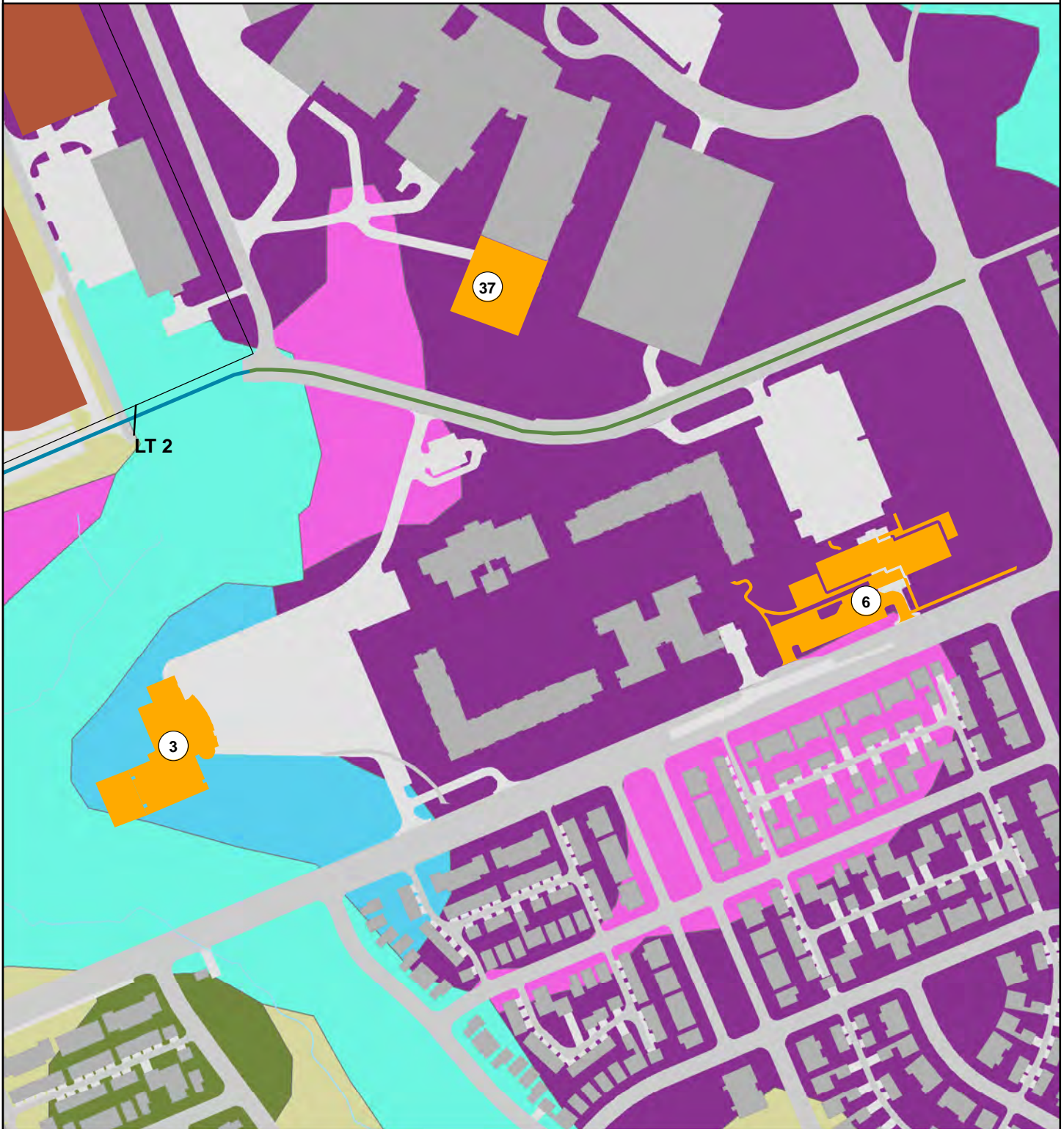
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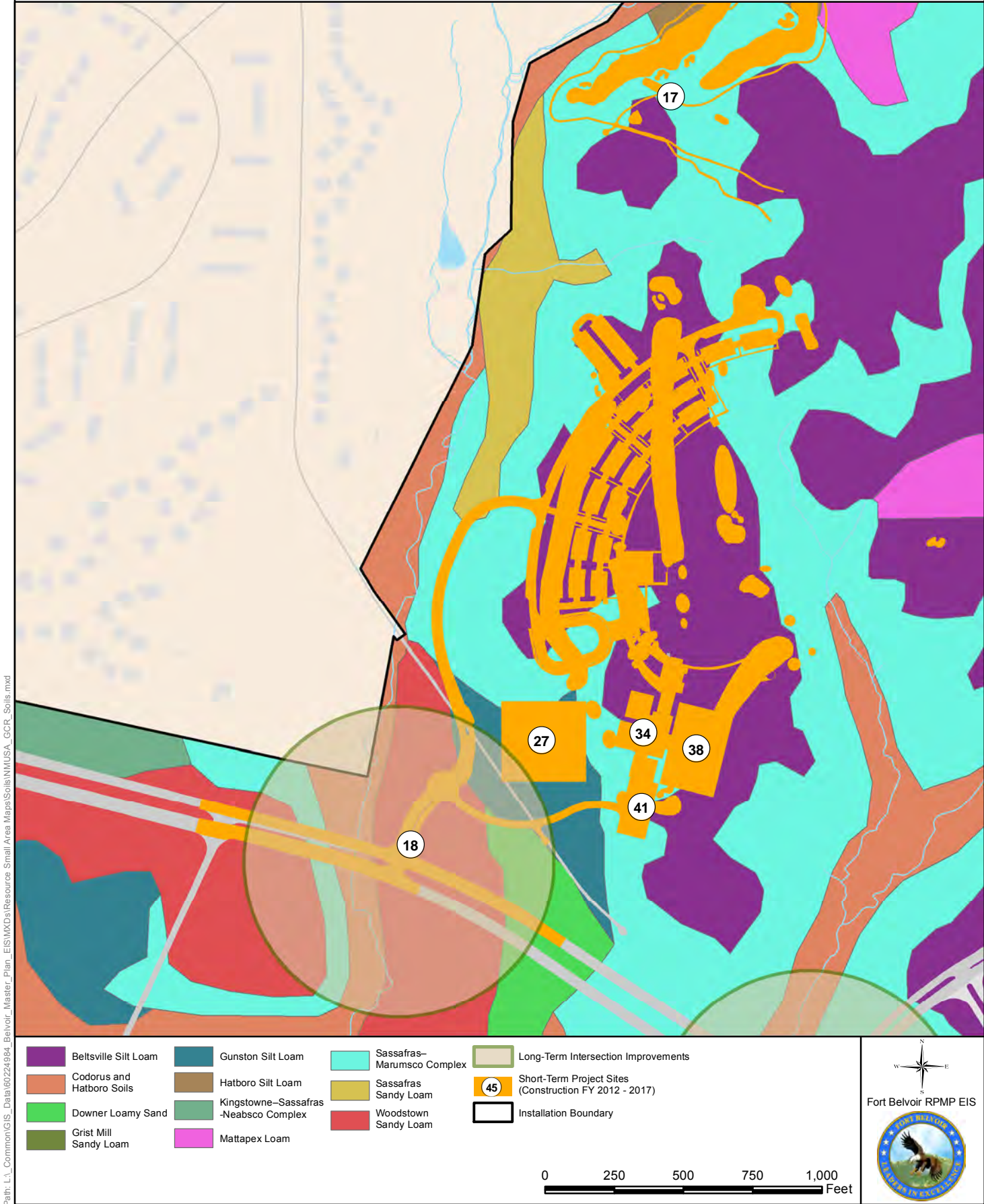
- | | | | | |
|-----------------------------|--|-----------------------------|-------------------------|---|
| Beltsville Silt Loam | Gunston Silt Loam | Mattapex Loam | Water | Short-Term Improved Road |
| Codorus and Hatboro Soils | Hatboro Silt Loam | Pits, Gravel | Woodstown Sandy Loam | Short-Term New Road |
| Elkton Silt Loam | Kingstowne-Sassafras-Marumscos Complex | Sassafras-Marumscos Complex | New ACP (2030) | 45 Short-Term Project Sites (Construction FY 2012 - 2017) |
| Grist Mill-Mattapex Complex | Lunt-Marumscos Complex | Sassafras Sandy Loam | Long-Term Improved Road | LT2 Long-Term Project Sites (Construction FY 2018 - 2030) |
| Grist Mill Sandy Loam | Matapeake Silt Loam | Urban Land | Long-Term New Road | Installation Boundary |



Soils - NICOE, Medical Office Building, USO

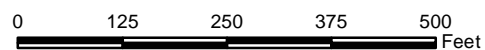
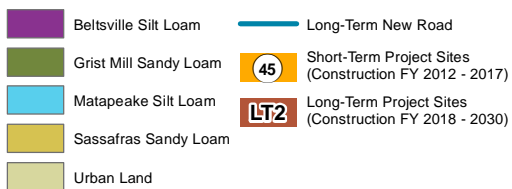


Soils - NMUSA & Golf Course Reconfiguration

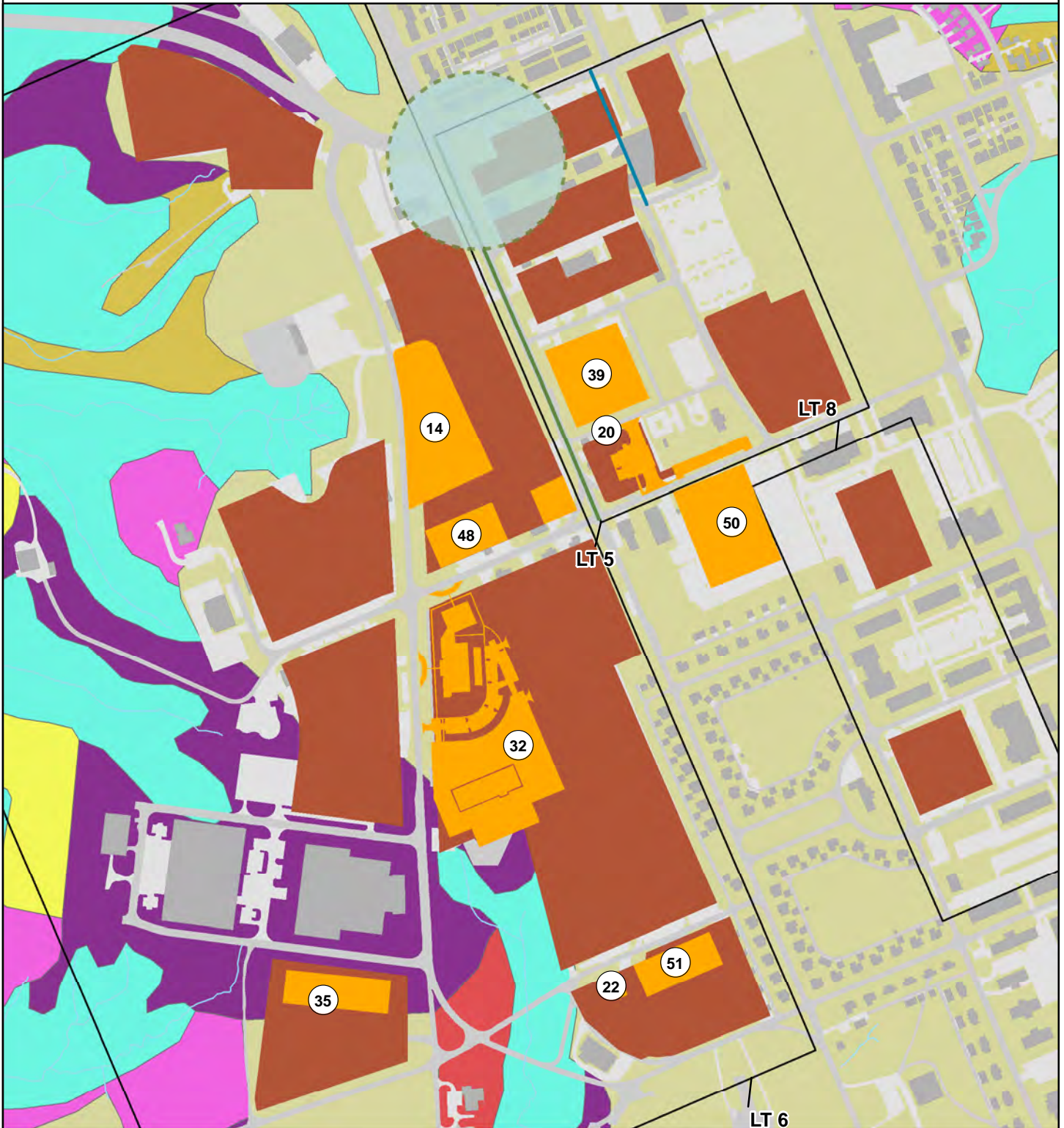


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Soils - Religious Education Center, CDC 144



Soils - South Post Town Center, Industrial Area, 200 Area



- | | | | |
|-----------------------------|----------------------|-------------------------|---|
| Beltsville Silt Loam | Sassafra Sandy Loam | Transit Transfer Center | Short-Term Project Sites
(Construction FY 2012 - 2017) |
| Mattapex Loam | Urban Land | Long-Term Improved Road | Long-Term Project Sites
(Construction FY 2018 - 2030) |
| Pits, Gravel | Woodstown Sandy Loam | Long-Term New Road | |
| Sassafra - Marumsco Complex | | | |

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Feet



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APPENDIX H
HAZARDOUS SUBSTANCES AND POTENTIALLY
CONTAMINATED SITES

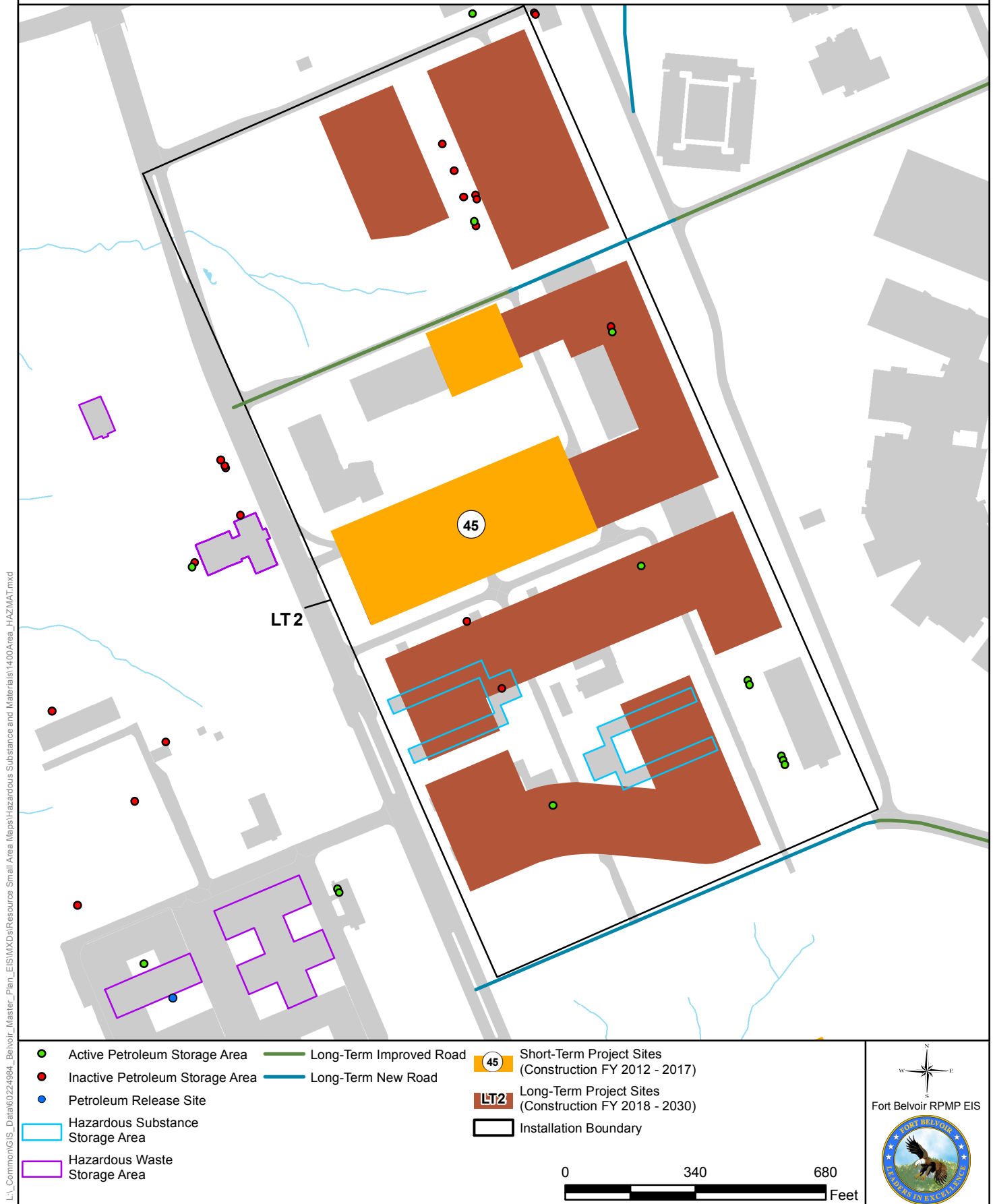
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TABLE OF CONTENTS

Hazardous Substances and Potentially Contaminated Sites Small Area Maps.....	H-1
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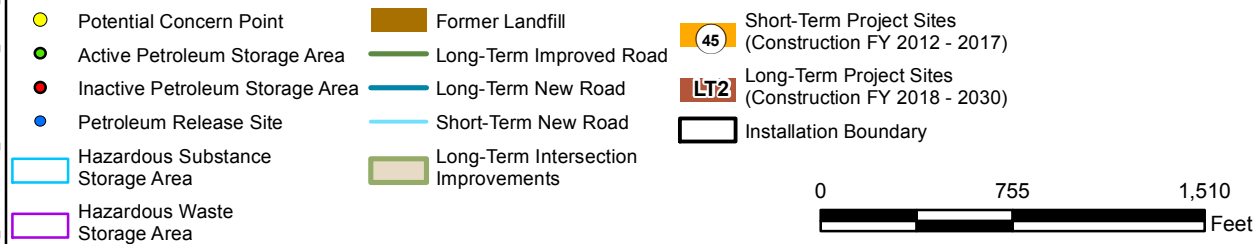
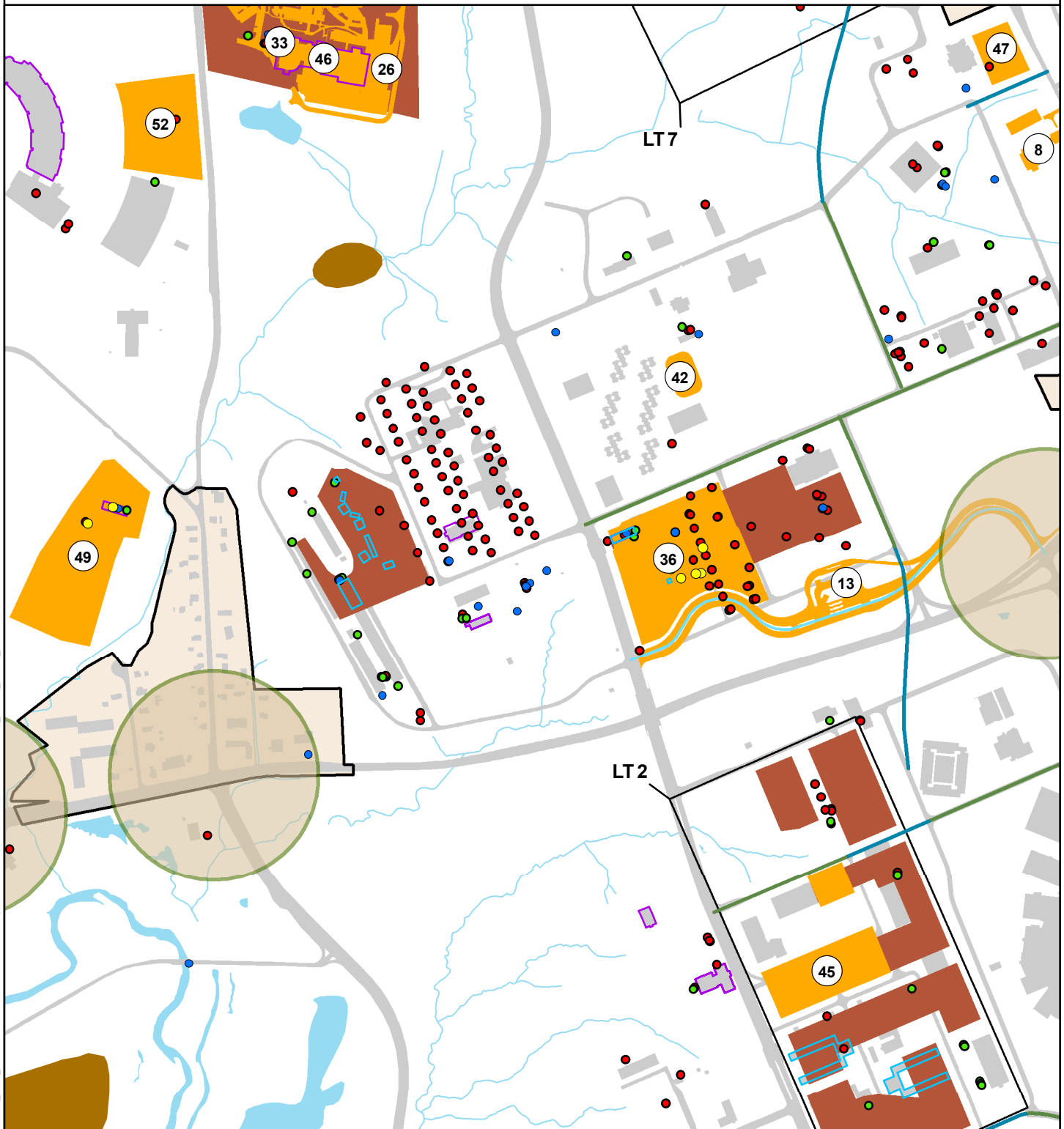
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Hazardous Substances and Potentially Contaminated Sites - Gunston Road Office Area (1400 Area & Secure Admin Facility)



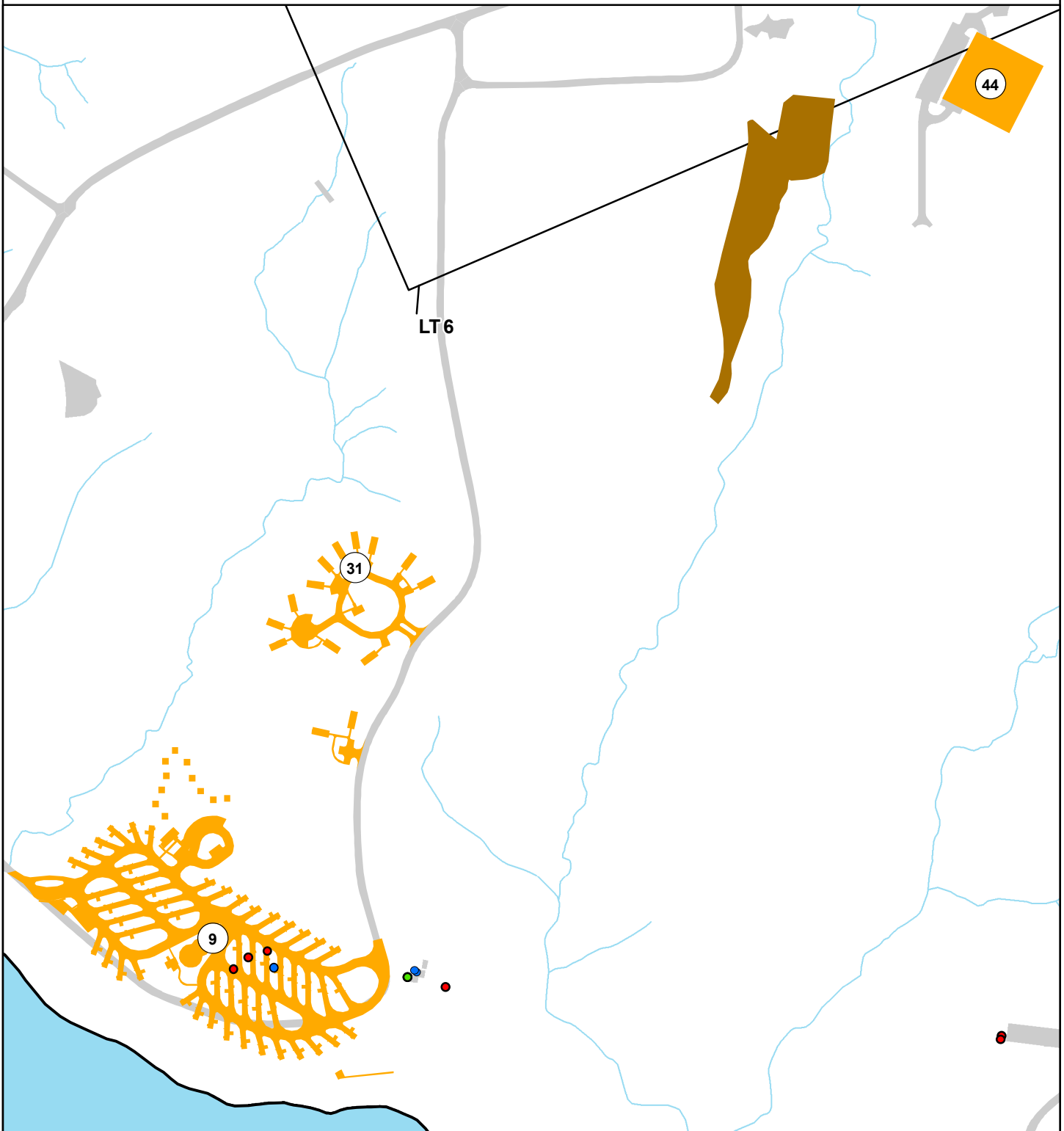
Hazardous Substances and Potentially Contaminated Sites - 29th Infantry HQ, Lieber Gate, OCAR Block, 911th Engineering Co.

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Hazardous Substances and Potentially Contaminated Sites - Ballfield Replacement, Family Travel Camp Phase 1 & 2

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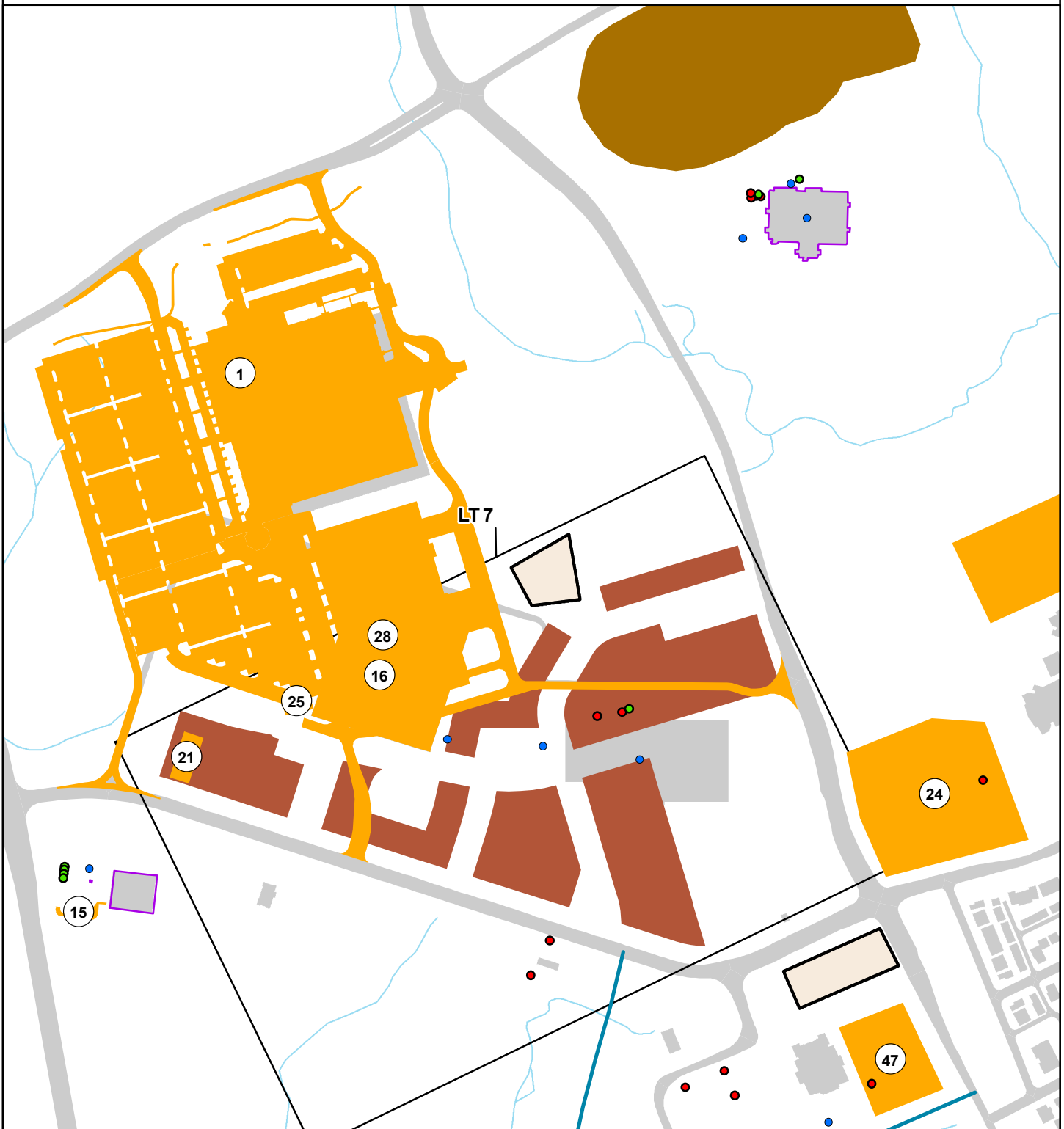
- Active Petroleum Storage Area
- Inactive Petroleum Storage Area
- Petroleum Release Site
- Former Landfill
- 45 Short-Term Project Sites
(Construction FY 2012 - 2017)
- Installation Boundary

0 375 750
Feet



Hazardous Substances and Potentially Contaminated Sites - Community Support Center, PX, Commissary

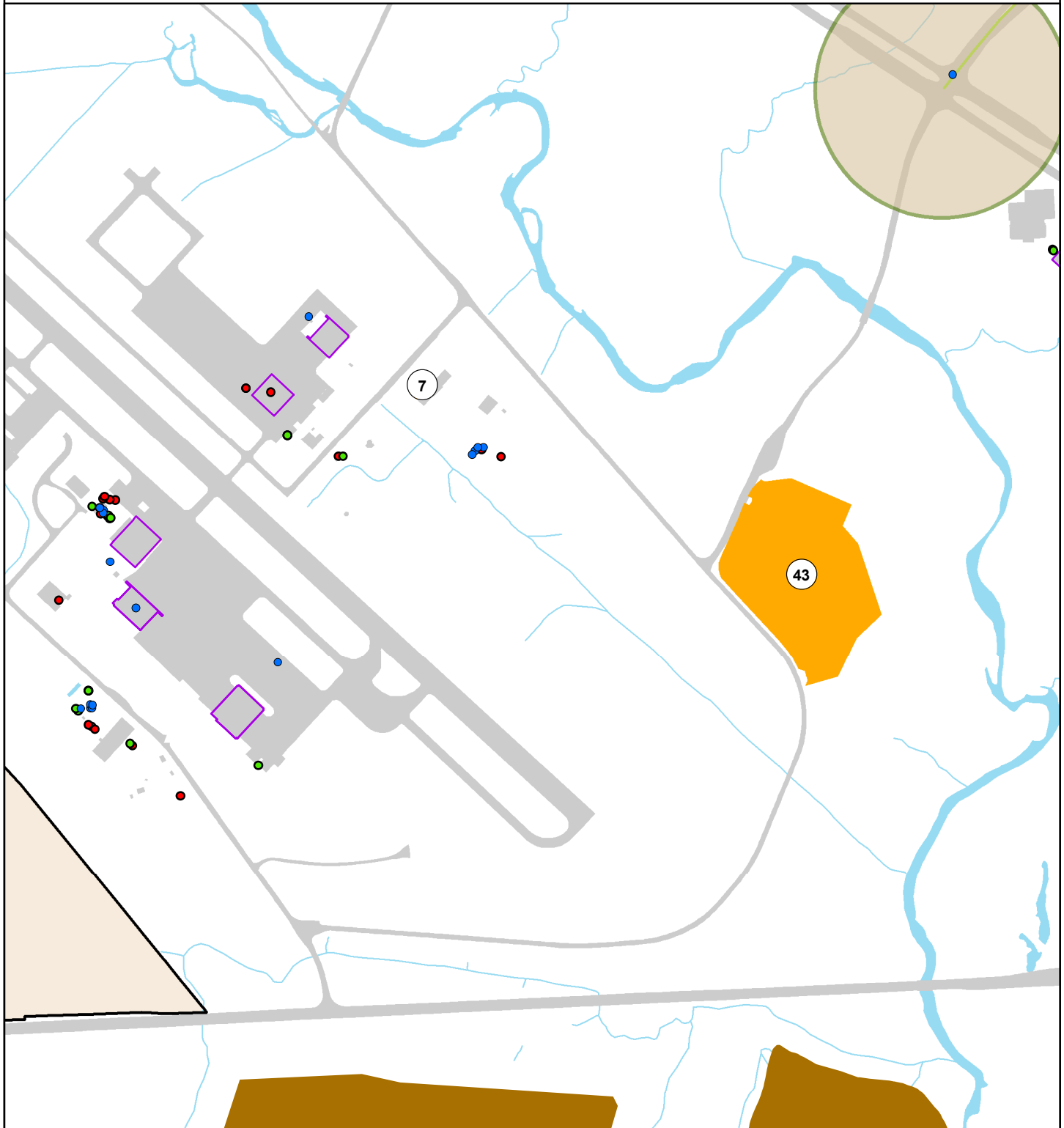
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- Active Petroleum Storage Area
- Inactive Petroleum Storage Area
- Petroleum Release Site
- Hazardous Waste Storage Area
- Former Landfill
- Long-Term New Road
- Installation Boundary
- 45 Short-Term Project Sites (Construction FY 2012 - 2017)
- LT2 Long-Term Project Sites (Construction FY 2018 - 2030)



Hazardous Substances and Potentially Contaminated Sites - Davison Army Airfield

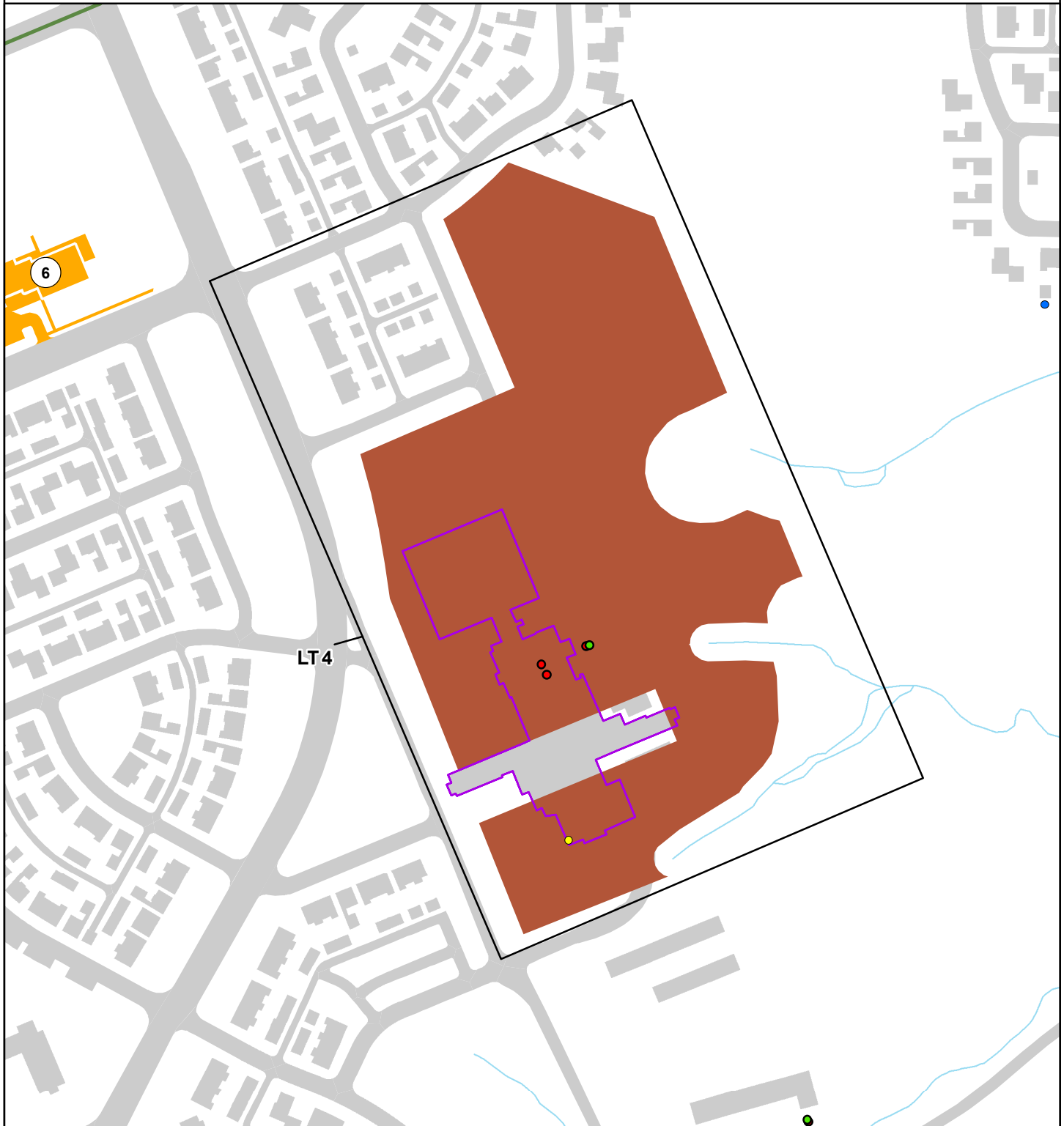


- Active Petroleum Storage Area
- Inactive Petroleum Storage Area
- Petroleum Release Site
- Hazardous Waste Storage Area
- Former Landfill
- Short-Term Improved Road
- Long-Term Intersection Improvements
- Near-Term Intersection Improvements
- 45 Short-Term Project Sites (Construction FY 2012 - 2017)
- Installation Boundary

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Hazardous Substances and Potentially Contaminated Sites - DeWitt Area



- | | | |
|--|---|--|
| ● Potential Concern Point | — Long-Term Improved Road | 45 Short-Term Project Sites
(Construction FY 2012 - 2017) |
| ● Active Petroleum Storage Area | Hazardous Waste Storage Area | LT2 Long-Term Project Sites
(Construction FY 2018 - 2030) |
| ● Inactive Petroleum Storage Area | | Installation Boundary |
| ● Petroleum Release Site | | |

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Feet



Hazardous Substances and Potentially Contaminated Sites - DLA & INSCOM

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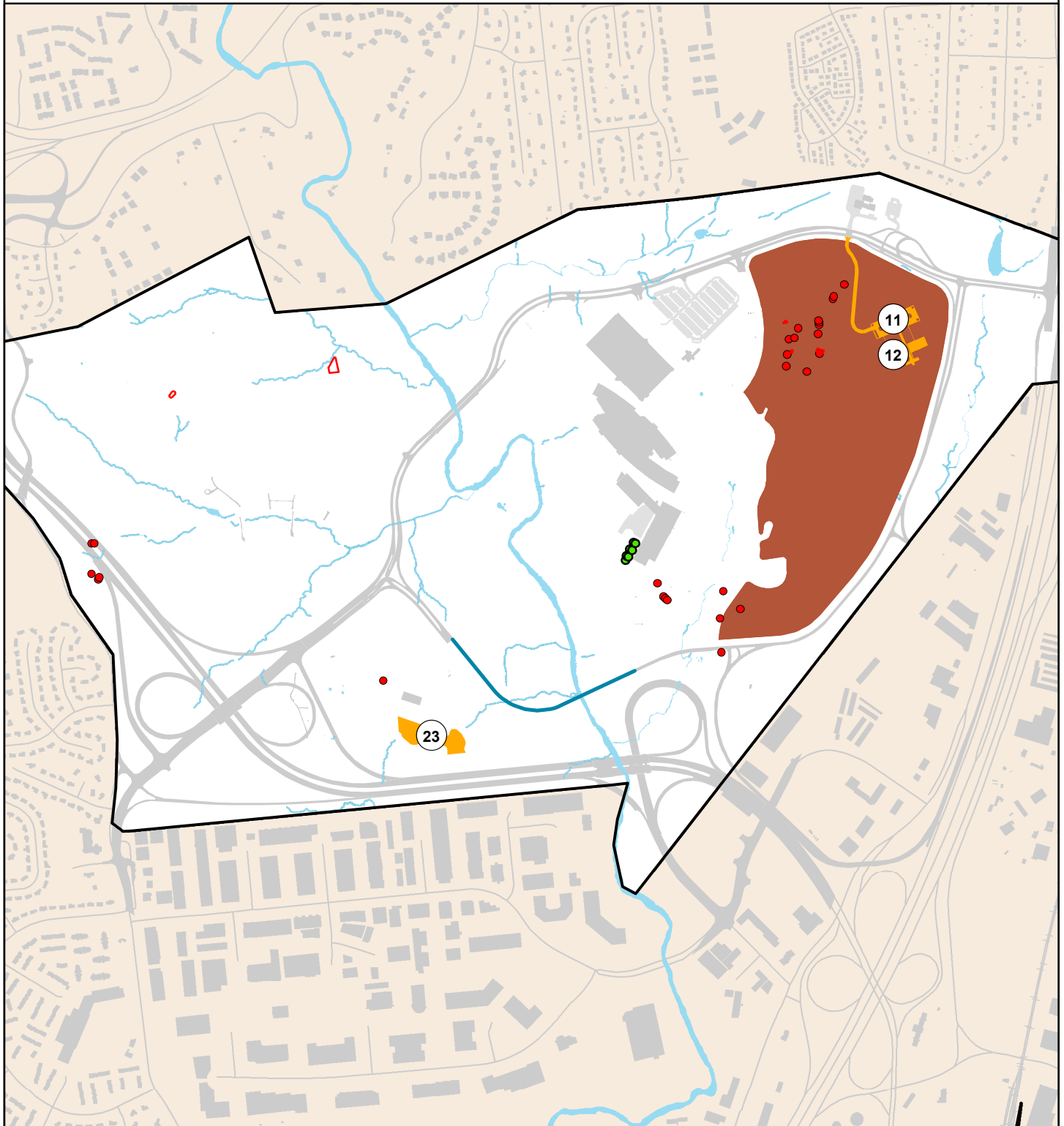
- Potential Concern Point
- Active Petroleum Storage Area
- Inactive Petroleum Storage Area
- Petroleum Release Site
- Short-Term Improved Road
- Hazardous Waste Storage Area
- Former Landfill

- 45 Short-Term Project Sites
(Construction FY 2012 - 2017)
- LT2 Long-Term Project Sites
(Construction FY 2018 - 2030)
- Installation Boundary

0 350 700
Feet



Hazardous Substances and Potentially Contaminated Sites - Fort Belvoir North Area



- | | |
|---|--|
| Potential Concern Site | 45 Short-Term Project Sites
(Construction FY 2012 - 2017) |
| ● Active Petroleum Storage Area | LT2 Long-Term Project Sites
(Construction FY 2018 - 2030) |
| ● Inactive Petroleum Storage Area | Installation Boundary |
| — Long-Term New Road | |

0 1,180 2,360
Feet

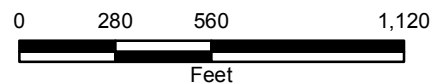


Hazardous Substances and Potentially Contaminated Sites - South Post Town Center, Industrial Area, 200 Area

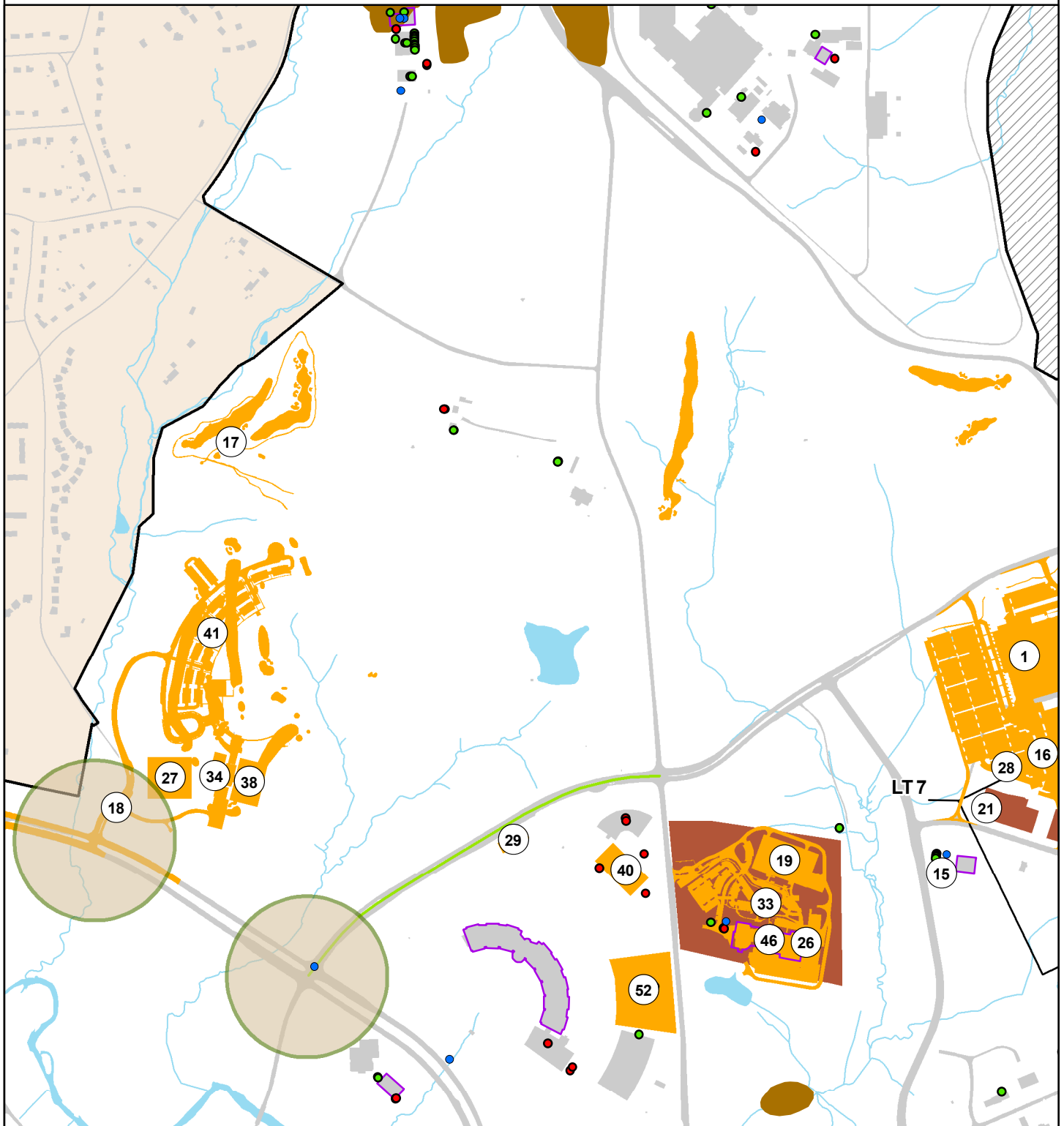
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- | | | |
|---|---|--|
| ● Potential Concern Point | — Long-Term Improved Road | 45 Short-Term Project Sites
(Construction FY 2012 - 2017) |
| ● Active Petroleum Storage Area | — Long-Term New Road | LT2 Long-Term Project Sites
(Construction FY 2018 - 2030) |
| ● Inactive Petroleum Storage Area | — Short-Term Improved Road | Installation Boundary |
| ● Petroleum Release Site | — Short-Term New Road | |
| Potential Concern Area | Transit Transfer Center | |
| Hazardous Substance Storage Area | | |
| Hazardous Waste Storage Area | | |
| Former Landfill | | |



Hazardous Substances and Potentially Contaminated Sites - Golf Course Reconfiguration

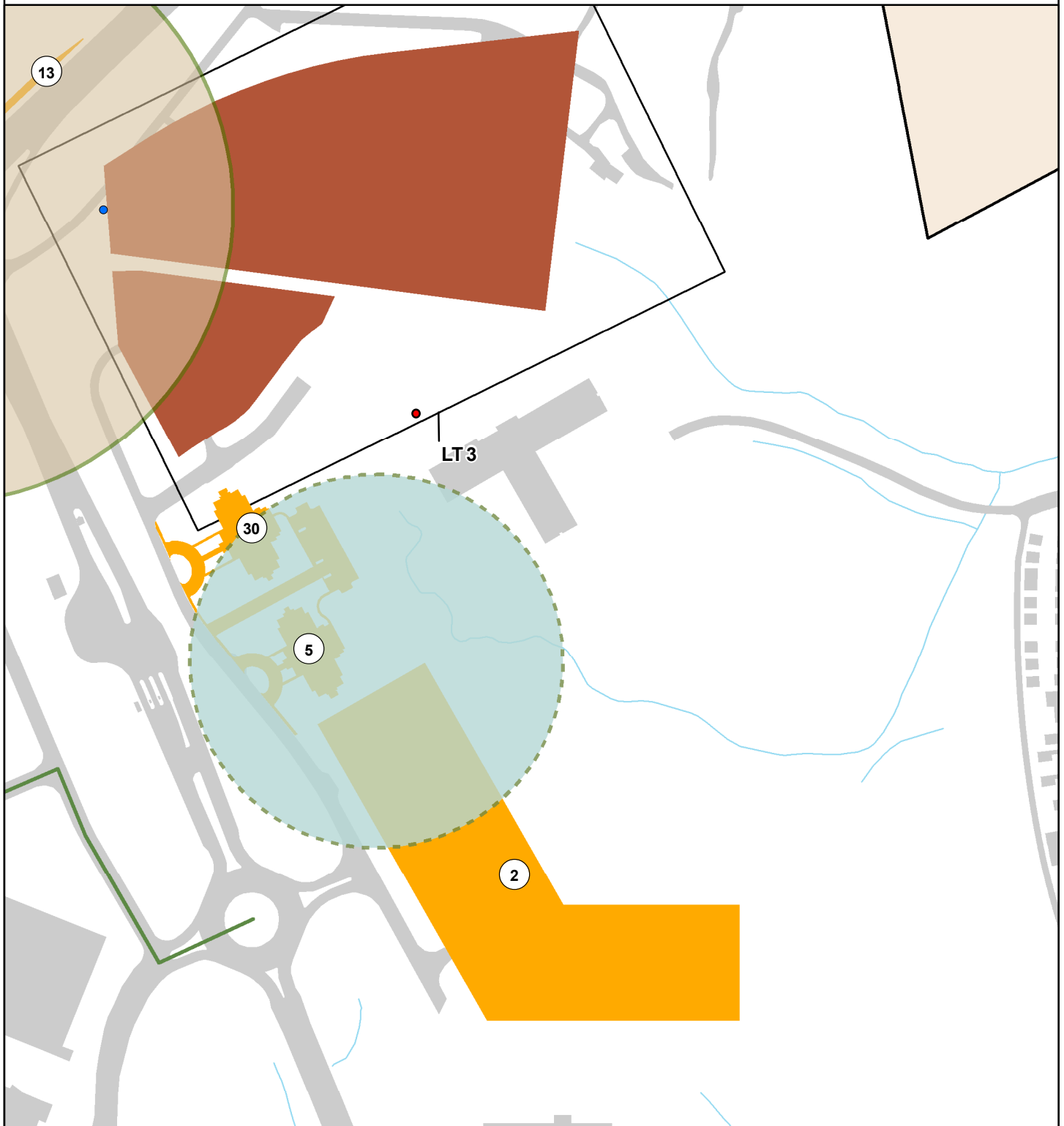


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|--|--|--|
| ● Potential Concern Point | Former Landfill | 45 Short-Term Project Sites
(Construction FY 2012 - 2017) |
| ● Active Petroleum Storage Area | Short-Term Improved Road | LT2 Long-Term Project Sites
(Construction FY 2018 - 2030) |
| ● Inactive Petroleum Storage Area | Long-Term Intersection Improvements | Installation Boundary |
| ● Petroleum Release Site | | |
| Potential Concern Area | | |
| Hazardous Waste Storage Area | | |

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Feet



Hazardous Substances and Potentially Contaminated Sites - Grays Hill, PAL East of Belvoir Rd, Fisher House 1 & 2



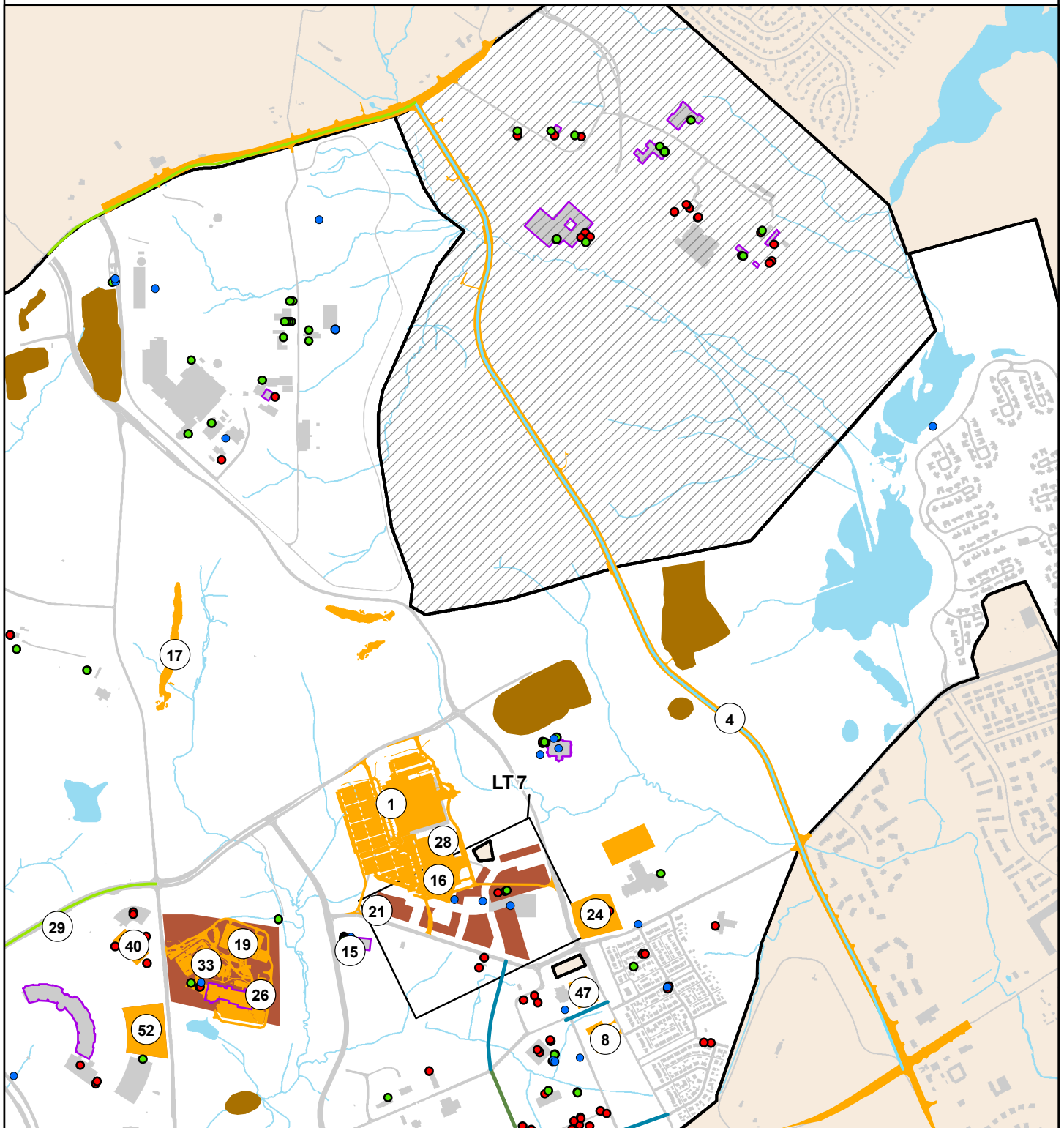
- Inactive Petroleum Storage Area
- Petroleum Release Site
- Long-Term Intersection Improvements
- Transit Transfer Center
- Long-Term Improved Road
- 45 Short-Term Project Sites (Construction FY 2012 - 2017)
- LT2 Long-Term Project Sites (Construction FY 2018 - 2030)
- Installation Boundary

0 270 540 Feet



Hazardous Substances and Potentially Contaminated Sites - Mulligan Road

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|--|--|---|
| ● Potential Concern Point | — Long-Term Improved Road | 45 Short-Term Project Sites
(Construction FY 2012 - 2017) |
| ● Active Petroleum Storage Area | — Long-Term New Road | LT 2 Long-Term Project Sites
(Construction FY 2018 - 2030) |
| ● Inactive Petroleum Storage Area | — Short-Term Improved Road | Installation Boundary |
| ● Petroleum Release Site | — Short-Term New Road | |
| Hazardous Waste Storage Area | | |
| Former Landfill | | |

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Hazardous Substances and Potentially Contaminated Sites - NlCoE, Medical Office Building, USO



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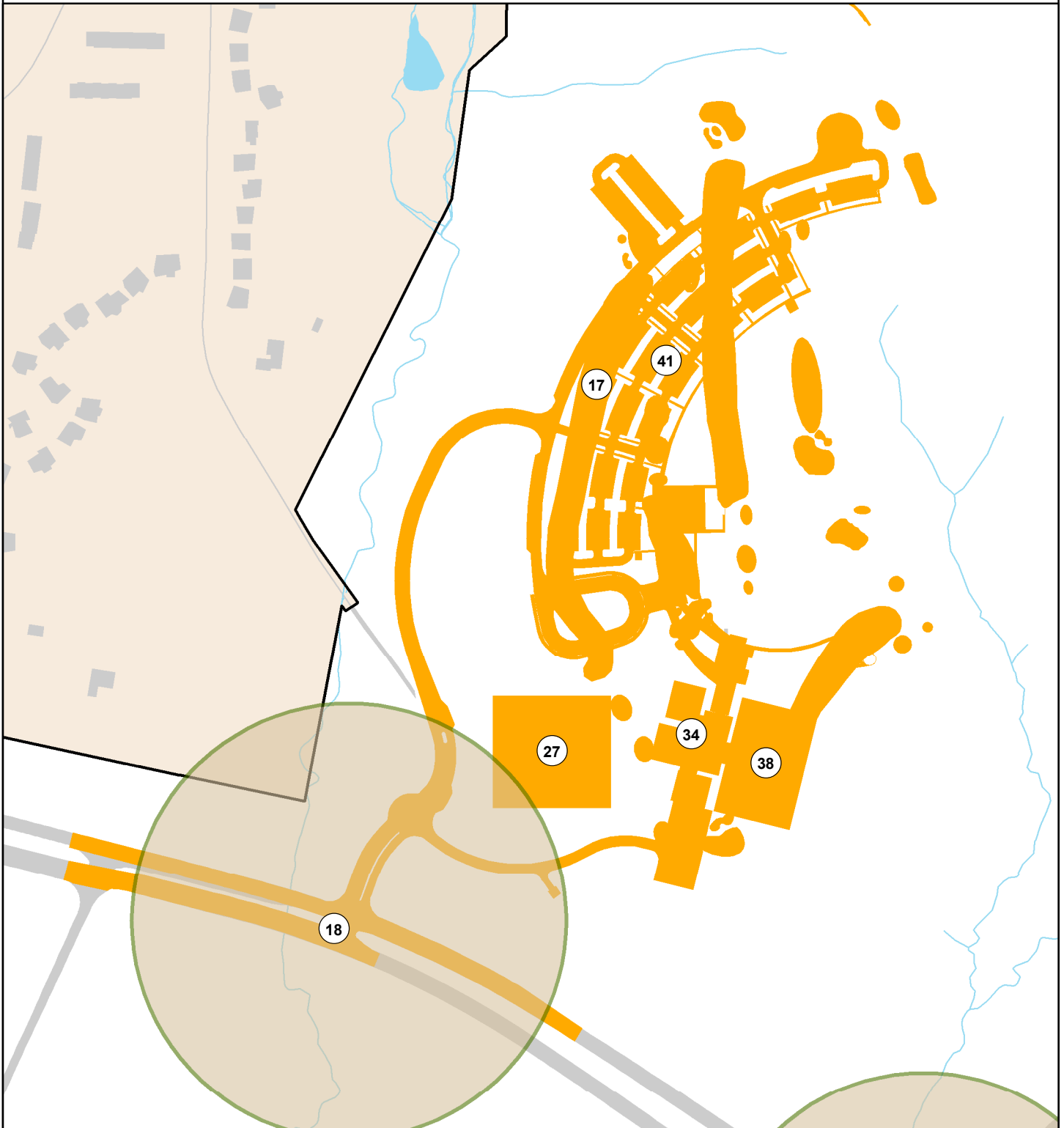
- Active Petroleum Storage Area
- Inactive Petroleum Storage Area
- Hazardous Substance Storage Area
- Long-Term Improved Road
- Long-Term New Road
- 45 Short-Term Project Sites (Construction FY 2012 - 2017)
- LT2 Long-Term Project Sites (Construction FY 2018 - 2030)
- Installation Boundary

0 260 520 Feet



Hazardous Substances and Potentially Contaminated Sites - National Museum of the US Army and Golf Course Reconfiguration

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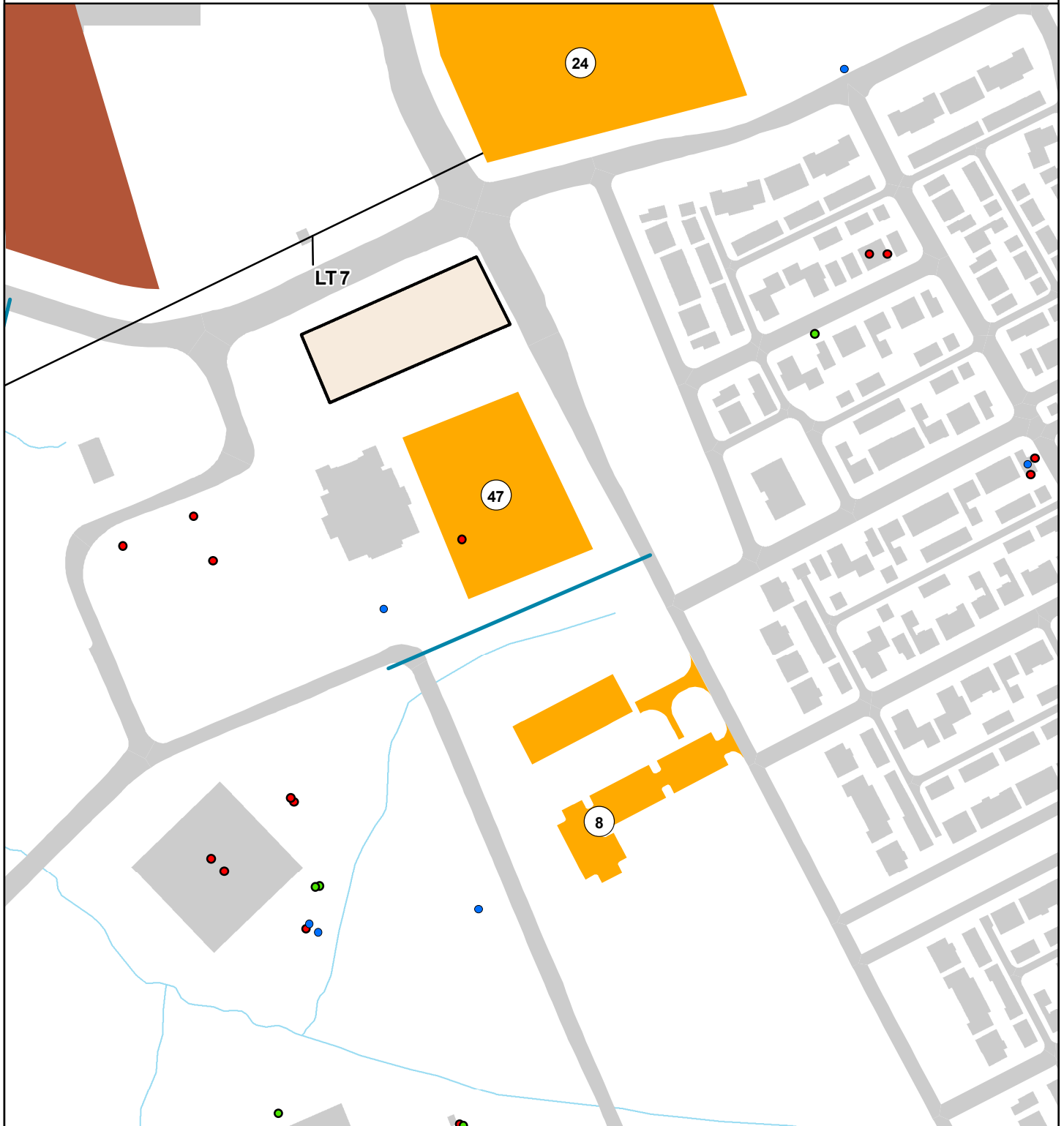


- Long-Term Intersection Improvements
- Short-Term Project Sites (Construction FY 2012 - 2017)
- Installation Boundary

0 360 720 Feet



Hazardous Substances Potentially Contaminated Sites - Religious Education Center, CDC 144



- Active Petroleum Storage Area
- Inactive Petroleum Storage Area
- Petroleum Release Site
- Long-Term New Road
- 45 Short-Term Project Sites
(Construction FY 2012 - 2017)
- LT2 Long-Term Project Sites
(Construction FY 2018 - 2030)
- Installation Boundary

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